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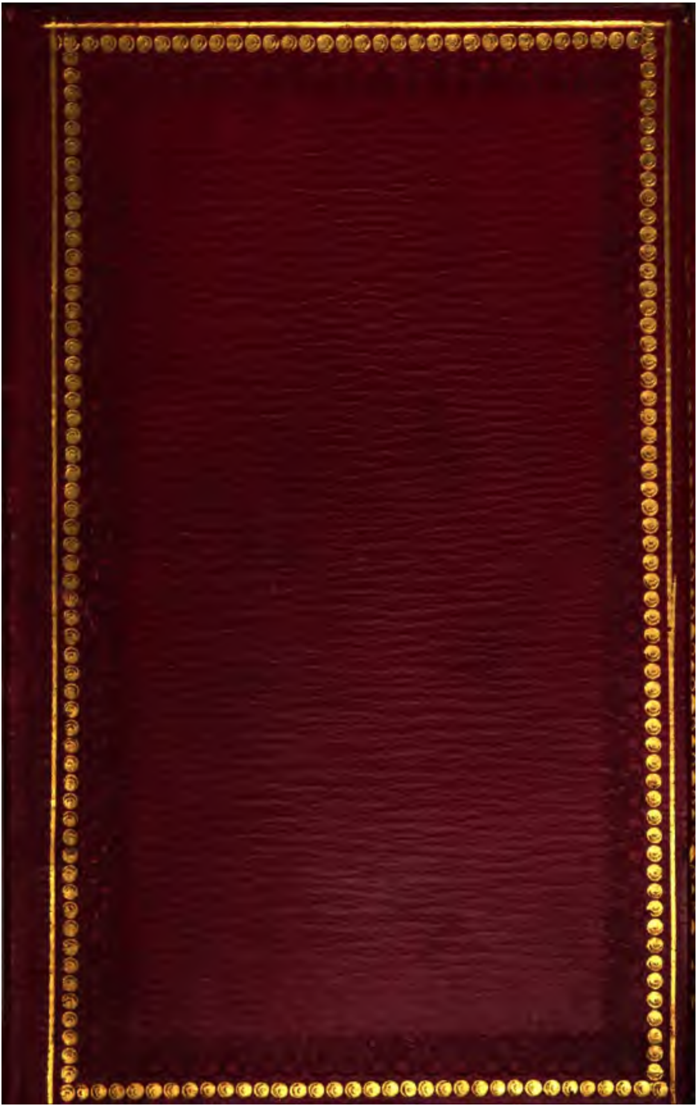

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POCKET ENCYCLOPEDIA

OR A

DICTIONARY

OF

ARTS, SCIENCES,

AND

POLITE LITERATURE:

COMPILED FROM THE BEST AUTHORITIES

BY

EDWARD AUGUSTUS KENDAL.

Embellished with Copper Plates designed and engraved by EMINENT ARTISTS.

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Pedals, the largest pipes of an organ, so called because played and stopped with the foot. The pedals are made square, and are usually thirteen in number. They are of modern invention. Their use is to carry the sounds an octave deeper than the other pipes.

Pedestal, the *foot* or *stand* of a column. There are as many kinds of pedestals as there are orders. See Architecture. The pedestal of a statue is not governed by the laws incident to those of columns.

Pediculus, the louse, in natural history, a genus of insects of the order Aptera. Some of the insects of this genus, of which there are seventy or eighty species, infest the bodies of quadrupeds, some infest birds, some insects, besides which there is the Pediculus humanus, which is distinguished by its pale livid colour. It is produced from a small egg, popularly called a nit, which is fastened or agglutinated by its smaller end to the hair on which it is deposited: from this egg proceeds an insect complete in all its parts, and only different from the parent animal in its smaller size.. When examined by the microscope, it is seen, that the trunk or proboscis, which is generally concealed in its sheath or tube, is of a sharp form, and is furnished towards the upper part with a few reversed aculei or prickles; the eyes are large, smooth and black: the stomach and intestines afford a distinct view of the peristaltic motion: the legs are each terminated by a double claw, not very much unlike that of a lobster, but of a sharper form, and the whole animal is every where covered by a strong granulated skin. Few insects are more prolific than the louse. It is said that in about eight weeks a louse might see five thousand of its own descendants.

Pediment, in architecture, a kind of low pinnacle, serving to finish a frontispiece, and which is placed as an ornament over gates, doors, windows, or niches. The pediment is ordinarily of an angular form; but sometimes it forms the arc of a circle. The parts of a pediment are, 1. the tympanum; 2. the cornice, which crowns it; and 3. the entablature, which serves it as a base or scale. The most beautiful proportions of the pediment are observed by Davilier to be obtained when the height is about one fifth of the base.

Peer, in general, an equal. Peers in the law of Britain, is a name that belongs to any class of persons who are the equals of each other. It is a fundamental law in the administration of justice, laid down by *magna-charta*, that every man shall be tried by his peers: hence a commoner is tried by a jury of commoners, and a lord by a jury of lords. It is observable that this privilege, however, so far as it is possessed by the lords, extends only to criminal cases: in civil actions, the advantage which the trial by peers was intended to secure, that of security against the prejudices which men of different conditions sometimes entertain against each other, is almost wholly on the side of the commonalty. If a mercantile question occur, a special jury of merchants, the precise *peers* in the case, may be required; but if a commoner sue a lord, the cause is decided by a common jury, with the exception that at least two *knights* be returned in the panel.

Peer, in a restricted sense, a lord of parliament, or peer of the realm. The lords of parliament are the peers of each other: for whatever formality of precedence may attach to the title of earl or duke, it is a *barony* which conveys the right to a seat in parliament, and confers every privilege annexed It is as a baron, not as a duke, bishop, &c. that a peer sits in parliament; and the parliamentary rights are, at the present day, the essence of nobility. In compliance with ancient *costume* (if the word may be thus employed) peers are sometimes still created by titles which convey the idea of local rights to which they have in reality no pretension; but though this is a mere form, the rank they gain is not an empty one: it is that of an hereditary legislator of the realm.

A peer is not to be put upon any inquest, even though the cause have a relation to two peers; and where a peer is defendant in a court of equity, he is not to be sworn to his answer, which is to be received upon the faith of his honour: but when he is to answer to interrogatories, or to make an affidavit, or to be examined as a witness, he is to be sworn.

Peer, *trial of a*. It is of the first importance that those public men which, in a free country particularly, will always be liable to the dangers of political animosity, should be secured against possible popular injustice; and for this reason, as well as because, with the rest of his fellow subjects, he claims to be tried by his equals, a temporal peer must be arraigned, whether on a charge of treason or of felony, before the house of which he is a member. On occasion of such a trial, all the lords, with the exception of the bishops, are to be summoned at least twenty days previous to its commencement. The proceedings are these: after the indictment is allowed, the king, by commission under the great-seal, appoints one of the peers, and usually the chancellor, to be high-steward, who sits as judge. To bring the indictment before the lord high-steward, a writ, called a *certiorari*, is issued out of the court of chancery, and the prisoner is brought by another writ. The high-steward assigns a day and place of trial; and twelve of the peers *must* be present. At the time and place appointed, the high-steward being seated in the customary state, the king's commission read, and other ceremonies performed, he declares to the prisoner at the bar the cause of the assembly, assures him of justice, and encourages him to answer without fear to the charge that is to be preferred against him. The indictment is then read, and the prisoner arraigned. After the evidence for the prosecution, and the answer, have been heard, the prisoner is ordered to withdraw from the bar, and the lords retire, in the manner of a common jury, to deliberate on their verdict. On their return, the high-steward openly demands of each several lord, whether the prisoner, calling him by his name, be guilty of the crime for which he is arraigned? and each lord, laying his right-hand upon his left-breast, separately answers, "Guilty," or "Not guilty, upon my honour." If, by a majority of votes, the prisoner be found guilty, he is brought to the bar again, and the high-steward acquaints him with the verdict of his peers, and passes sentence and judgment accordingly; or, acting as he does by commission, the high-steward may take time to advise upon the judgment, and his office continues till that be passed.

It is to be observed that the appointment of a high-steward only takes place when the parliament is not sitting. If the trial occurs during the session, it is said to be in the *high court of parliament;* the peers officiate at once as jurors and judges; and their speaker collects the votes: when the parliament is not sitting, the trial is said to be in the court of the *high-steward of England.* The peculiarities attending the trial of a peer are two: 1. The number of jurors is greater than ordinary, every peer having a right to sit; 2. unanimity is not required, but the decision depends upon the majority, which, however, must amount to twelve.

Peeress, a woman who is noble by descent, creation, or marriage. If a peeress by descent or creation marries a person under the degree of nobility, she still continues noble; but if she has obtained the dignity by marriage only, by a subsequent marriage with a commoner she loses it; though, by the courtesy of England, she always retains the title. Except that, as a woman, she cannot sit and vote in the house of lords, a peeress enjoys every privilege of a peer.

PELECANUS, the pelican, in natural history, a genus of birds of the order Anseres, of which there are thirty species. The Pelican onocrotatus, or the great pelican, is sometimes of the weight of 25lb. and the width between the extreme points of the wings, of fifteen feet. The skin between the sides of the upper mandible is extremely dilatable, and capable of containing many quarts of water. The skin is often used by sailors for tobacco pouches, and has been occasionally converted into elegant ladies' work-bags. These birds are very numerous about the Caspian and Black seas, and they are chiefly to be found in the warmer regions, inhabiting almost every country of Africa. They build in the small isles of lakes far from the habitations of man. The nest is a foot and a half in diameter, and the female, if molested, will remove her eggs into the water till the cause of the annoyance is removed, returning them then to her nest of reeds and grass. These birds, though living principally on fish, often build in the midst of desarts, where that element is scarcely to be found. The Peleeanus aquilus, or man-of-war-bird, is of this genus: of this bird it is said that it will oblige others to quit the prey which they have just made, and are flying off with, and that it seizes it as it drops from them with a dexterity truly admirable. The Pelecanus carbo, or cormorant, is a species of the Pelican genus. The cormorant is trained to fish for its master, and it performs its business with so much dexterity, as to yield its owner large profits. See Plate Nat. Hist. fig. 37.

Penates, in Roman antiquity, tutelar deities, either of countries or of particular houses, in which last sense they were the same with the *lares*. The penates were originally the tutelar gods of the Trojans; but being adopted by the Romans, they were thus named.

Pendant, 1. an ornament, made of various materials, and fastened to the ear, lip, or nostril; 2. those streamers or long colours which are split toward the termination, and hung at the head of the mast of a ship, or at the end of a yard-arm.

Pendulum, in mechanics, a heavy body, so suspended as that it may vibrate, or swing backward and forward, about some fixed point, by the force of gravity. The vibrations of a pendulum are called its oscillations. From the precision of its motions, it is employed in measuring time and space. The distance of a ship, from which a gun is fired, may be ascertained by measuring the interval of time between the flash and the sound of a gun; and, upon the same principle, the distance of a cloud, by numbering the seconds or half-seconds between the lightning and the thunder: thus, supposing that between the lightning and thunder ten seconds are counted, it follows (sound passing through 1142 feet in a second) that the distance of the cloud is 11420 feet. Height also, as the height of a room, may be measured by a pendulum vibrating from its top; and by the same instrument, the force of gravity on the various parts of the earth's surface is discovered, and thence the true figure of the whole.

The length of a pendulum that vibrates seconds in the latitude of London is 39.2 inches: that of one which vibrates ½ seconds is $\frac{39.2}{4} = 9.8$ inches, and that of ¼ seconds $= \frac{9.8}{4} = 2.45$ inches, and one to vibrate once in 2 seconds, will be $39.2 \times 4 = 156.8$ inches.

One imperfection belongs to the pendulum, the remedy of which is a great object of pursuit among men of science. It is, that its length, upon which every thing depends, is perpetually liable to alteration from the influence of heat and cold, the former of which expands, and the latter contracts all metalline bodies.

Penitents, an appellation belonging to certain religious fraternities. Penitents are distinguished from each other by the shape and colour of their habits. They are secular societies, and have their rules, statutes, churches, and public processions, under their particular crosses or banners, and are more than a hundred in number. The most considerable are those of the white-penitents of Rome, of which the first was constituted in the year 1264; and the black-penitents, among whom the *brethren of mercy* were instituted in the year 1488. The first bestow portions upon young women, in order to their being married, and wear white sackcloth, with a circular badge on the shoulder, marked with a red and white cross: the second were instituted among the Florentines, for the purpose of attending criminals during their imprisonment and at their death. At the time of execution, they walk in procession, singing the litanies and seven penitential psalms; and when the malefactors have suffered the punishment of the law, they take the bodies from the gibbet, and give them burial. There are other of these charitable societies, whose business it is to bury such persons as are found dead in the streets, and they distinguish themselves by the representaion of a skull on one side of their habit: add to these there are blue, red, grey, green, and violet penitents, all named after the colour of their clothing.

PENNON, or PENON, in heraldry, a small pointed flag, borne by a gentleman. When knighthood was conferred upon him, the point was cut off, and the square flag that remained bore the name of *banner*.

PENNY, an ancient silver coin, which was the only coin current among our Saxon ancestors. It was with them equal to the $\frac{1}{240}$th part of a pound. In Etheldred's time the penny was the 20th part of an ounce troy, hence the denomination penny-weight. Till the time of Edward the first the penny was struck with a cross so deeply sunk into it that it might on occasions be easily broken, and parted into halves and quarters, hence the terms half pences and farthings or quadrantes.

PENNY-*weight*, a Troy-weight containing 24 gains, each of which is equal in weight to a grain of wheat gathered out of the middle of the ear, and well dried.

PENSIONER, or PENSIONARY, one who receives an annuity from another, whether in consideration of service past or present, or merely as a benevolence.

PENSIONARY, *Grand*, in the old Government of Holland, the first minister of state. He was chairman in the assemblies of the states of that province, and as such, proposed matters to be consulted on, collected the votes, formed and pronounced the resolutions, and opened letters. He conferred with foreign ministers, inspected the finances, maintained the authority of the states, and was perpetual deputy to the states-general. His commission was given him for five years; at the end of which it was always renewed, though it might have been conferred upon another. *Pensionary* was the name by which the Hollanders chose to designate all their ministers.

Pensioners, *gentlemen*, in the royal establishment of Great Britain, a band of forty gentlemen, instituted by Henry the Eighth, who receive yearly pensions of one hundred pounds, and who on state occasions, attend the person of the king in the quality of guards. They usually bear gilt battle-axes; but in the event of taking the field, their weapons are curassier-arms, with sword and pistols, and their standard a red cross on a white flag. Their captain is always a nobleman; and their inferior officers are a lieutenant, a standard-bearer, a clerk of the check, a secretary, a paymaster, and an harbinger. Each gentleman is to keep three double horses, and a servant; so that the band constitutes a troop of horse.

Their duty is to attend the king, armed with their battle-axes, to and from the chapel-royal; to receive him in the presence-chamber, or on coming out of his private apartments; to attend him on all great solemnities, as his coronation, St. George's feast, public audiences of ambassadors, ·d processions to the house of lords. One half of their number, by quarterly rotation, constantly wait at the palace; but on the occasions enumerated, the whole body is in attendance. At a coronation, and St. George's feast, they serve up the sovereign's dinner; and at these times it is usual that such two gentlemen as the captain selects and presents receive the honour of knighthood.

Pentagon, in geometry, a figure having five sides and five angles. If the five sides are equal, the angles are so too, and the figure is called a regular pentagon.

Pentagraph, or Parallelogram, an instrument by means of which it is intended that drawings may be copied upon a similar, a reduced, or an enlarged scale, according to the pleasure of those who use them, and without requiring any skill in drawing; but there are few pentagraphs that can describe even strait lines with any tolerable correctness.

Pentameter, in ancient poetry, a kind of verse consisting of *five* feet or *metres*, whence its name. The two first feet may be either dactyls or spondees; the third must be a spondee; and the two last, anapests; as in the following verse of Ovid:

1 2 3 4 5
Carmini | bus vi | ves tem | pus in o | mne meis.

A pentameter verse, subjoined to an hexameter, constitutes what is called *elegiac*.

Pentecost, a solemn festival of the Jews, retained in the Christian church on account of the miraculous descent of the Holy-Ghost on the apostles, which happened on one of the annual returns of its celebration. The feast of Pentecost was instituted in memory of the promulgation of the law, and so named because that event took place on the fiftieth day after the escape from Egypt.

Penumbra, in astronomy, a partial shade observed between the perfect shadow and the full light in an eclipse, and arising from the magnitude of the sun. If that body were a mere point, the whole shadow would be perfect; but by reason of its diameter, it happens that a body which is not illuminated by the whole, still receives a part of its rays.

Pepper, in natural history and commerce, an aromatic, dry, and hot berry. Black-pepper, the fruit of a shrub of the creeping-kind, growing in several parts of the East Indies. The berries are produced in clusters, and change, as they ripen, from a green colour to a red, and afterward to a black. White pepper differs from the black only in being stripped of its corticle or covering. To strip them, the black berries are steeped in sea-water, and after they have been exposed to the sun for several days, the chaff is rubbed off with the hands. In this operation, the pepper loses much of its original warmth. Some persons assert, that there is also a species of pepper naturally white.

Perambulator, in mechanics, an instrument used by surveyors in measuring distances, and also known by the names *pedometer*, *way-wiser*, and *surveying-wheel*. It consists of a wheel, two feet seven inches and a half in diameter; and consequently, half a pole, or eight feet three inches in circumference; a carriage or handle; and a dial plate, marked with miles and subdivisions, with a hand which, by means of the machinery, points out the progress of the wheel. The proper office of this instrument is that of measuring roads and large distances, where expedition and moderate accuracy are required.

Perception, in logic, the first act of the mind, which consists in the reception of ideas through the medium of the senses. The first objects that strike our senses, says the author of the *Analyse de l'Homme*, give us our first ideas; and our wants are the cause of our *attention*: the repetition of these ideas, and the developement of new wants, give birth to our sentiments and thoughts: it is thus that nature *creates* our souls. The eyes convey the ideas of colours, the ears those of sounds, the nostrils those of odours, and the palate those of savours: these ideas have no connection with each other; they are separate ideas of different qualities of bodies; but the sense of *touching* unites the whole in *one* object, which may happen to be at the same time coloured, odorous, savoury, and sonorous.

Percussion, in mechanics, the impression a body makes in falling or striking upon another: or the shock of two bodies in motion. Percussion is direct or oblique: direct, when the impulse is given in a line perpendicular to the point of contact, and oblique, when it is given in a line oblique to the point of contact.

Perennial, a term applied to those plants whose roots abide many years, whether they retain their leaves in winter or not; those which retain their leaves are called ever-greens, but such as cast their leaves, are called deciduous. Some of these have annual stalks which die to the root every autumn, and shoot up again in the spring.

PERFECT *number*, is that, all whose aliquot parts added together, make the same number with the number of which they are such parts. Thus 6 is a perfect number being equal to 1+2+3. So also is 28 being equal to 1+2+4+7+14. The following are given as the first six perfect numbers: 6; 28; 496; 8128; 33550336; 8589869056.

PERIHELIUM, in astronomy, that point of a planet or comet's orbit, wherein it is at its least distance from the sun, in which sense it stands opposed to aphelium.

PERIOD, in astronomy, the time taken up by a star or planet in making a revolution round the sun.

PERIOD, in chronology, a revolution of a certain number of years, and another word for a *cycle*; a century is a period or cycle.

PERIOD, in rhetoric, a speech or series of words, complete within itself. All the qualities which compose the excellence of a period may be arranged under the two heads of *correctness* and *beauty*. A period must contain one subject of discourse, the whole of that subject, and nothing extraneous.

In writing, the period and its parts, which in speech are marked by the inflections of the voice, are to be distinguished by certain characters appropriated to each. These characters are called *points*, and the act of using them *pointing*, or punctuation; an art the principles of which yield in importance to none which belong to literature, and yet appear to be little understood. The general idea respecting them is, that they are to be placed according to the *taste*, that is the arbitrary choice of the writer; and particularly in such a manner as shall render the enunciation agreeable to his ear. This view of the subject, however, is so far from being just, that, in reality, the points have nothing to do with the ear. The sense of which the ear is the organ, is to be satisfied by the harmony of the style, not by mere punctuation.

Periœci, in geography, such inhabitants of the earth, as have the same latitudes, but who live in opposite longitudes; or live under the same parallel, and the same meridian, but in different semicircles of that meridian. These have the same common seasons throughout the year, but when it is noon-day with one, it is midnight with the other.

Periosteum, in anatomy, a nervous, vasculous membrane, endued with a very quick sense, immediately surrounding, in every part, both the internal and external surfaces of all the bones of the body, excepting only so much of the teeth as stand above the gums, and the peculiar places on the bones in which the muscles are inserted: it is hence divided into the external and internal periosteum; and where it externally surrounds the bones of the skull, it is usually called the *pericranium*. The seeming sensibility of the bones is that of this membrane.

Peripatetic *philosophy*. See Philosophy, *peripatetic*.

Periscii, in geography, the inhabitants of either frigid zone between the polar circles and the poles, where the sun, when in the summer signs, appears to move only round them, without setting, and consequently their shadows, in the same day, turn to all the points of the horizon.

Peristaltic *motion*, a vermicular spontaneous motion of the intestines performed by the contraction of the circular and longitudinal fibres of which the fleshy coats of the intestines is composed, by means of which the chyle is driven into the orifices of the lacteal veins, and the fœces driven forwards.

Perjury, in law, the crime of swearing falsely, where a lawful oath is administered by one in authority, in a matter relating to the issue or cause in question, whether it be a person's own wilful act, or one committed at the subornation of another.

Peroration, in rhetoric, the epilogue, or last part of an oration, wherein what the orator insisted on through his whole discourse is urged afresh with greater vehemence. The peroration consists of two parts: a rapid recapitulation of what has been said before; and a declamatory address to the passions. The qualities requisite in the peroration are, animation and brevity.

Perpendicular, in geometry, a line falling directly on another line, so as to make the angles on each side equal.

Perpetual *screw*, is one that is acted upon by the teeth of a wheel, and which continues its action for an indefinite length of time, or so long as the teeth of the wheel continue to act upon it.

Perpetuity, is the number of years in which the simple interest of any principal sum will amount to the same as the principal itself: or it is the number of years purchase to be given for an annuity which is to continue for ever; and it is found by dividing 100*l*. by the rate of interest agreed on: thus allowing 5 per cent. the perpetuity is $\frac{100}{5}=20$: if 4 or 6 per cent. be the interest agreed on, then the perpetuity in one case will be $\frac{100}{4}=25$, in the other $\frac{100}{6}=16.66$.

PERSIA, a country in Asia, is bounded on the North by Russia, the Caspian sea, and Independent Tartary, on the East by the Mogul empire, from which a ridge of mountains, and the river Indus divide it: on the South it has the Arabian Sea, and the Persian gulf, and on the West it has Georgia, Curdistan, Armenia, and Arabia. It is about 1150 miles in length North and South, and 1280 from West to East. These are the greatest measures, and in some parts it is much narrower. The temperature and climate are various; at about a league's distance from Ispahan, there is a stone four feet high, and when the snow happens to cover the ground to that height, it is the sign of a plentiful year. The first peasant who carries the news of it to the court receives a handsome reward, equal to 230*l.* sterling. It rarely rains in this country, excepting in the month of April, and the heat, in some parts, is so great as to induce mortal diseases upon the weak and the intemperate. The lands are exceedingly fertile, corn quickly ripens, and, in particular districts, they have three crops in a year. The fruits are excellent: the celebrated Shiraz wine is the produce of their grapes. The government is monarchical, and the religion that of Mohammed. The laws of Persia exclude the blind from the throne, hence the reigning prince usually orders the eyes of all the males of the royal family, of whom he entertains any jealousy, to be put out.

PERSONIFICATION, the attributing of life and action, to an object or idea by the act of the imagination.

PERSPECTIVE, that branch of optics which teaches how to represent objects on a plane surface, in the manner they appear under the peculiarities incident to distance and height. This is a science of the first importance to the painter; yet he is not to be too strictly confined to its rules, but to make them subservient to his own purposes. Nothing should tie up his hands: he should not have his genius imprisoned; but be at liberty to express his idea, with one stroke of his pencil; and, as Fresnoy counsels, "let the compasses be rather in his eyes than in his hands:" there let him measure distinctly every object by comparison, the principal talent that he should own. If he is well acquainted with the principles of his art, he will not stop at the dry rules of geometry, while his fancy is sketching all the principal parts of the picture; but proceed with the whole, and when the design is fixed, correct such parts as require it by the laws of perspective.

Perspective in a practical sense is the art of drawing, according to the principles of geometry, the true representations of real objects. Suppose we view a point situated beyond an upright transparent plane, as a glass window, the spot where a straight line from the eye to this point will go through the window is the perspective representation of it: for the eye views all objects by means of rays of light, which proceed from it, to the different points of the object, in straight lines, thus Plate Perspective, fig. 1. shews the whole art of perspective: let E be the eye, NE its height from the ground O P, and R S T V a square object laid flat upon the ground. Now it is evident, that the eye will see the object R S T V, by means of the rays of light which come from every part of the object to the eye. Let us therefore suppose a transparent plane, A K, like a glass-window, to be fixed perpendicularly upon the ground O P, between the spectator N E and the object R S T V; and it will be evident, that the rays R E, S E, T E, and V E, will be cut by the transparent plane A K in the points *r*, *s*, *t*, *v*; which points are called the projections, or in other words, the perspective representations of the corresponding points R, S, T, V, of the original object. And if lines are drawn from the several points *r*, *s*, *t*, *v*, so as to join each other, the figure so described will be the projection or perspective representation of the whole original figure R S T V upon the picture.

In like manner, suppose R S T V, fig. 2, to be raised perpendicular to the ground O P, and parallel to the picture, but every thing else remaining in the same situation as in the former figure; then will *r s t v* be the representation of R S T V: for it is the section of the picture with the rays R E, S E, T E and V E, which come from the original object to the eye. And here let us observe, that when the original object is parallel to the picture, its representation, *r s t v*, will not only be parallel to the original, but exactly like it, though smaller in proportion as the original object is farther from the picture; and if the original be brought to D, so as to coincide or touch the picture, then the representation will be equal to the original: but on the contrary, the original may be supposed so far removed from the picture, that the angles which the rays subtend at the eye, growing smaller and smaller continually, it will at last totally disappear; and, consequently its representation upon the picture will disappear also. Again, if the original is brought to coincide with the picture, then the representation of R V (fig 1.) will not only be equal to the bottom of the original, but will likewise be at the bottom of the picture, viz. in the line A B, which is the section with the ground plane O P. But, as the original is removed farther and farther from the picture, the representation will rise higher and higher, till at last the original, being supposed at an infinite distance, its representation will vanish into an imaginary point C, exactly as high above the bottom of the picture, as the eye E is above the ground, or original plane, O P, upon which the spectator, the picture, and the original object are now supposed to stand. And so also in regard to objects that lie flat upon the ground; when their sides are parallel, then the representations of those sides will be parallel also: thus the representation *r v* of R V, and *s t* of S T, are parallel to their originals, but severally diminished in proportion to their distance from the picture; and therefore the representations *r s*, *v t* of the perpendicular sides, R S, V T (which must join *r s*, *v t* to complete the representation of the whole original figure) cannot be parallel to their originals, but will be oblique in the picture, and would, if continued towards the top of the picture, converge into an imaginary point C, exactly as high above the bottom of the picture, as the eye E is above the original plane O P. Now these points, into which we suppose the representations of the parts of any objects to vanish upon the picture, are called by the general name of vanishing points.

From hence then we may form an idea of the nature of the perspective plane or picture, and of perspective representations; which representations are nothing more than the sections which the picture makes with the rays of light in their passage from original objects to our eyes; and that the whole of this art depends upon finding the exact section, or true shape, which that cutting of the rays makes upon the picture in all kind of situations, and in giving them a proper degree of light and colour.

But to illustrate this by a familiar instance. Suppose a spectator to be looking at a prospect without doors, from within, through a glass-window; he will perceive not only the vast extent which so small an aperture will admit to be seen by his eye, but also the shape, size, and situation of every object upon the glass: If the objects are near the window, the spaces, which they take upon the glass, will be proportionably larger than when they are at a greater distance; if they are parallel to the window, then their shapes upon the glass will be parallel also; but if they are oblique, then their shapes will be oblique, and so on. And he will always perceive, that as he alters the situation of his eye, the situation of the objects upon the window will be altered also: if he raises his eye ever so high, the objects will seem to keep pace with his eye, and rise higher upon the window; and the contrary, if he places it ever so low. And so in every situation of the eye, the objects upon the window will seem to rise higher or lower; and consequently, the depth of the whole prospect will be proportionably greater or less, as the eye is elevated or depressed; and the horizon will, in every situation of the eye, be upon a level with it: that is, the horizontal line, or that imaginary line which parts the earth and sky, will seem to be raised as far above the ground upon which the spectator stands, as his eye is removed from the same place.

Let us now suppose two planes A B G D, *a b g d*, (fig. 3), of the same height and parallel to each other, one to pass through the eye E, and the other through any line as *a b*, and both to be perpendicular to the ground A B *a b*; and let us imagine another plane G D *g d* to be laid upon these two planes A B G D, *a b g d*, as in the figure, it will be evident that this plane G D *g d*, is parallel to the ground A B *a b*, because it lies upon two planes, A B G D, *a b g d*, of the same height. Now if we suppose the plane G D *g d* to be continued to an infinite distance, and the line *g d* to represent a part of the real horizon, and then imagine a picture K M L H to be placed between the eye E, and the horizon *g d*; then its section H L, with the horizontal plane G D *g d*, will be the indefinite representation of the horizon *g d*, upon the picture; and this representation is called the horizontal line. Now since all objects which lie flat upon the ground, or are parallel to it, seem to vanish into the real horizon, therefore the representations of all such objects upon the picture must vanish into this horizontal line, because it is the perspective representation of the real horizon; and, for the same reason, the ground, or whole extent between the eye and the real horizon, will not appear to lie flat, but to rise upwards. For let E be the eye, K M *a b* the ground, and K M *a b* the utmost extent which the eye can distinguish; now, I say, the ground will not appear to lie flat, like K M *a b*, but to rise upwards, like K M *g d*, till it cuts the plane G D *g d*, that is drawn through the eye E, parallel to the original or ground plane A B *a b*; and the section *g d*, which the planes K M *g d* and G D *g d* make with each other, will represent the real horizon. And, as before, if we suppose a picture, K M L H, to be fixed between the eye and the said horizon; then the section HL, which the picture makes with the parallel plane G D *g d*, will be the indefinite representation of the horizontal line upon the picture; because the rays of light, *g* E, *d* E in their passage from the section *g d*, will cut the picture in the line H L.

From hence, then, we may see the grand principle upon which perspective depends; namely, in finding the lines and points into which objects seem to vanish upon the picture: and the chief difficulty in perspective only requires to have a clear idea of the nature and property of vanishing lines and vanishing points, and a few other requisites which he may partly conceive by what has been said already, and by considering, that as the horizontal line H L is produced by means of the plane G D *g d*, which passes through the eye parallel to the ground, or original plane; so, in the very same manner, all other vanishing lines are determined, namely, by imagining a plane to pass through the eye parallel to those planes whose representations are required upon the picture. Again, in regard to vanishing points; these are determined by drawing lines from the eye, parallel to the original lines, till they cut the picture; in order to which we must always suppose these lines to lie in some plane, and then having found the vanishing line of that plane, the vanishing point of any line in that plane may be found also. From hence we may observe, that the horizontal line is of the same nature with any other vanishing lines, and differs from them only in being more useful; because many more objects are perpendicular and parallel to the picture, than oblique with it: and therefore the great stress, which hath been laid upon this line by most writers, is not so very significant as they apprehended; for, in some cases, it is of no use at all in a picture. For let us consider a little: if vanishing lines upon the picture are always to be produced by planes passing through the eye parallel to the original figures, then no original plane can have its vanishing line in the horizontal line, unless it is parallel to the ground; but, if any object be obliquely situated with regard to the ground, then the plane, which is to pass through the eye parallel to the original, in order to determine its vanishing line, will be oblique with the ground also; and therefore it cannot pass through the horizontal line, but will be either above, below; perpendicular to it, or cross it in an oblique manner. The situations of objects may be reduced under the following heads. 1. When they are perpendicular to the picture or parallel to the ground, that is to the plane of the horizon. 2. When they are parallel to the picture, or perpendicular to the ground. 3. When they are obliquely situated, both as to the picture and the ground.

The following definitions should be carefully attended to. "The point of sight," is that point, where the spectator's eye is placed to view the picture. Thus E, in the foregoing figures is the point of sight, or place of the eye.

If from the point of sight E, a line E C be drawn perpendicular to the picture, the point C, where that line cuts is called "The centre of the picture."

"The distance of the picture" is the length E C, which line is drawn from the eye, perpendicular to the picture.

By the phrase "Original Object" is meant the real object, whose representation is sought whether it be a line, point, or plane figure: and by "Original Plane" is meant that plane upon which the real object is situated: thus the ground plane O P, (fig. 1.) is the original plane, and R S T V the original object.

If an original line S R be continued so as to cut the picture, the point F, where it cuts the picture, is called the intersection of the original line or its "intersecting point."

"The vanishing line" of an original plane is that line where a plane passing through the eye, parallel to that original plane, cuts the picture; thus, H L, E L, &c. are the vanishing lines of their several original planes, R S T V.

"The vanishing point" of an original line is that point where a line drawn from the eye parallel to that original line cuts the picture.

If from a point of sight E, a line E C be drawn perpendicular to any vanishing line H L, the point C, where that line cuts the vanishing line, is called "The centre of that vanishing-line." "The distance of a vanishing line" is the length E C, which is drawn from the eye perpendicular to the said line.

PERSPECTIVE, *aerial*, the art of giving a due diminution or degradation to the strength of the light, shade, and colours of objects, according to their different distances, the quantity of light which falls on them, and the nature of the medium through which they are seen. As the eye does not judge of the distance of objects entirely by their apparent size, but also by their strength of colour and distinction of parts; so it is not sufficient to give an object its due apparent bulk according to the rules of *stereography*, unless at the same time it is expressed with that proper faintness and degradation of colour which the distance requires: thus if a man at a distance were painted of a proper magnitude for the place, but with too great distinction of parts or too great strength of colour, it would appear to stand forward, and seem proportionally less, so as to represent a dwarf situated near the eye, and out of the plane on which the painter intended it should stand.

By the original colour of an object is meant, that colour which it exhibits to the eye when duly exposed to it in a full, uniform light, at such a moderate distance as to be clearly seen: now this colour receives an alteration from many causes, the principal of which are the following:

1. The removal of the object to a greater distance from the eye, whereby the rays of light which it reflects are less vivid, and the colour becomes more diluted, and tinged in some measure, by the faint bluish cast, or dimness or haziness of the body of air through which the rays pass.

2. The greater or less degree of light with which the object is enlightened; the same original colour, at an equal distance from the eye, having a different appearance in the shade, proportioned to the degree, from what it has in the light.

3. The colour of the light that falls on it, resulting from the reflection of coloured light from an adjacent object, or its passage through a coloured medium, which will exhibit a colour compounded of the original one of the object, and itself.

4. The position of the surface of the object, or of its several parts, with respect to the eye; the colours that front the eye appearing more lively and distinct than those that are seen obliquely.

5. The closeness or openness of the place where the object is situated; the light being much more variously directed and reflected within a room than in the open air.

6. The natural reflection of light by some original colours, in greater proportion than others, though equally exposed to its rays; whereby the degradation of these, at any given distance, will be different from that of those others.

From these several causes it happens that the colours of objects are seldom seen pure and unmixed, but generally arrive at the eye broken and softened by each other; and therefore in painting, where the natural appearances of objects are to be described, all hard or sharp colouring should be avoided.

A painter who would succeed in aërial perspective, ought carefully to study the effects which distance in its different degrees, or accidental colours of light, have on each particular colour; so that in a picture of various coloured objects, he may know how to give each original colour its proper diminution or degradation.

As all objects in a picture are proportioned to those placed in front; so in aërial perspective, the strength of light, and the brightness of the colours of objects close to the eye, that is, in the front-ground of the picture, must serve as a standard with respect to which all the same colours, at different distances, must have a proportional degradation in like circumstances.

In order to give any colour its proper degradation in proportion to its distance, it ought to be known what the appearance of that colour would be, were it close to the eye, regard being had to that degree of light which is chosen as the principal light of the picture: for if any colour is made too bright for another, or for the general colouring of the picture, it will have a glaring appearance, seem to start out of the picture, and throw a flatness and damp upon the rest of the work; or, in the technical phrase, the brightness of that colour will kill the rest.

Perspiration, in medicine, evacuation of the juices of the body through the pores of the skin. Perspiration is distinguished into sensible and insensible; the former of which is vulgarly called "*sweating*," and the latter "*perspiration*" only.

Perspective.

Fig. 1.

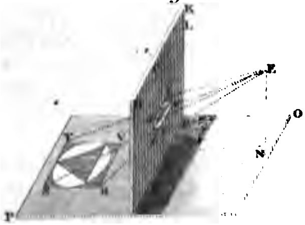
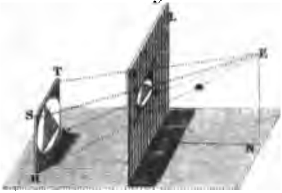


Fig. 2.



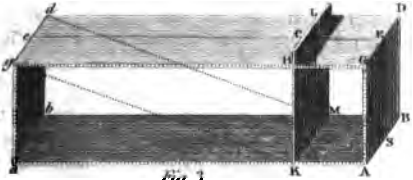


Fig. 3.

Cooper Sculp

Published by J. Harris, St. Pauls Ch. Yd. [illegible]

Its use is in clandestine attacks, to break down gates, bridges, or barriers, to which it is hung; and in countermines, to break through the enemy's galleries, and give his mines vent. Its invention is ascribed to the Huguenots, who took Cahors by its means, in the year 1579.

PETRIFACTION, in natural history, the conversion of wood, bones, and other substances into stone. Petrified bodies are more or less altered from their original state, according to the different substances among which they have lain in the earth. Some are found but very slightly changed; and others so highly impregnated with crystaline, sparry, pyritical, or other extraneous matter, as to appear mere masses of stone, or lumps of the matter of the common pyrites: but generally with the external dimensions, and more or less of the internal figure of the bodies into the pores of which this matter has made its way.

PETROLEUM, (also called rock-oil, which name is a translation of the former), an extremely subtile and penetrating fluid, of the bituminous kind, found in rivers, in wells, and trickling down the sides of hills, along with little streams of water. The substances which mineralogists have distinguished by the names asphaltum, maltha, petroleum, and naptha, are thought by some modern philosophers, to be mere varieties of one species, and form a series which passes into coal. Asphaltum forms the connection with pitch-coal. This is found in veins, and in small masses, and also sometimes on the surface of lakes. Maltha is softer, has a degree of tenacity, and a strong bituminous smell. Petroleum is semi-liquid; semi-transparent; of a reddish brown colour, and fetid odour. Naptha is of a lighter colour, more or less transparent, perfectly liquid, light, odoriferous, volatile and inflammable. In several parts of France, petroleum is found floating on the water, and is known by the name of oil of Gabian.

PETROMYZON, the lamprey, a genus of fishes of the order Cartilaginei. It is shaped like an eel. Their are nine species. The Petromyzon marinus or the great lamprey, is usually of a brown olive colour tinged with yellowish white. It frequently grows to the length of three feet, is an inhabitant of the seas, but ascends the rivers early in the spring, in which it resides a few months, and then returns to the ocean. It is viviparous, and supposed to subsist almost entirely on worms and fishes. Its heart is enclosed not in a soft, but in a cartilaginous pericardium, constituting thus a singular deviation from the general structure of animals. Its spine is a cartilage rather than a bone. Fishes of this genus fasten themselves with the jagged edges of the mouth to large stones, with the most extraordinary firmness. They have a wonderful tenacity to life, and various parts of the body long continue to move after it is separated from the head: and the head itself will adhere to a rock for hours after the greater part of the body is cut away. The Severn is the river in this country, in which lampreys are usually found, and they are highly prized when they first arrive from the sea. The Petromyzon fluviatilis, or lesser lamprey, is very abundant in the Thames; many thousands are caught in the year, sometimes as many as half a million, which are exported for the Dutch cod and turbot fishery at the rate of about 40 shillings a thousand. These fishes will live many days out of water. In Russia they are taken from beneath the ice, packed in snow, and exported to great distances, and will often recover themselves, when thrown into the water.

Petunse, in natural history, one of the two substances of which porcelain is made; a coarse kind of flint. The other is **Kaolin**. They both consist of silex, alumine, and lime, and when mixed, they, together, give a compound of silex and alumina, with less than 5 per cent. of lime.

Pewter, an artificial metal, compounded of tin, lead, and brass, in the following proportions: tin, one hundred weight; lead, fifteen pounds; and brass, six pounds.

Phænomenon, a Greek word, signifying an appearance. In philosophy, it is used to denote any appearance in nature, whether according to the usual course of things, or uncommon, or drawn forth by experiment.

Phalæna, the moth, in entomology, a genus of insects of the lepidoptera order. These insects are nocturnal, and fly abroad only in the evening and during the night, feeding on the nectar of the flowers. The larva is active and quick in motion, mostly smooth, more or less cylindrical, and preys on the leaves of various plants. Of all the moths the Phalæna mori is by far the most important. This is a whitish moth, with a broad pale brown bar across each of the upper wings. The caterpillar or larva, known by the popular name of the silk-worm, is, when full grown, nearly three inches long. It feeds on the leaves of the white mulberry, but in defect of these on the leaves of the other mulberry, or even on those of the lettuce. The silk worm remains in its larva state about six weeks, changing its skin four times during that period, and like other caterpillars, abstaining from food for some time before each change. When entirely full grown, the animal ceases altogether to feed, and begins to form itself a loose envelope of silken fibres in some convenient spot, which it has chosen for the purpose, and afterwards proceeds to enwrap itself in a much closer covering, forming an oval yellow silken case, or ball, about the size of a pigeon's egg, in which it changes into a chrysalis, and after lying thus enclosed for the space of fifteen days, gives birth to the moth. See SILK-*worm*.

PHALANX, in Grecian antiquity, a square battalion, consisting of eight thousand men, with their shields joined, and pikes crossing each other, and which it was almost impossible to break.

PHARMACY, the art or science of choosing, preparing, and mixing drugs; constituting one branch of the "therapeutic" branch of medicine.

PHAROS, or PHARE, a light-house, or lofty building near the sea, where a fire is kept burning during the night, to serve as a beacon to vessels. See BEACON.

The Pharos of Alexandria, built in the reign of Pharos, was one of the most celebrated works of antiquity, and from this circumstance the name is given to edifices of a similar description. The tower of king Pharos stood at the mouth of the Nile, it consisted of several stories or galleries, surmounted with a lantern, and was seen for many leagues at sea, and all along the coast.

PHASIANUS, the pheasant, in natural history, a genus of birds of the order Gallinæ: of which there are ten species: the Phasianus gallus, or wild pheasant, inhabits the forests of India, has been seen in almost all the Indian and South sea islands, and is unquestionably the origin of all the domestic varieties throughout Europe. The most interesting animal of this species is the dunghill cock, which is found in greater vigour and perfection in England, than in any other country: the irascibility and jealousy of this animal have in almost all ages and countries, occasioned it to be employed in the sanguinary practice of cock-fighting. The female is remarkable for great fecundity, and for the most exquisite parental fondness and sensibilities. In Egypt chickens are produced from eggs by means of the artificial heat of ovens, in lieu of the natural temperature of the hen.

Phæton, the tropic-bird, is of the order Anseres. There are three species of this genus. The Phæton æthereus, or common tropical bird, is always found within or at least very near the tropics. They frequently soar to a prodigious height, but generally near the surface of the water, watching the movements of the flying-fish, whose escape from the pursuit of the shark, porpoise, &c. is attended with destruction from the frigate, or man-of-war-bird, the pelican and tropic bird. They occasionally repose upon the backs of the drowsy tortoises, as the latter float in the water, and in these circumstances they are taken with the greatest ease.

Philology, the *love* or pursuit of *language*, a science of which grammar, rhetoric, poetry, and criticism are branches. As the illustration of these topics involves every object of literature, its history and that of its authors, philology is a sort of universal science: yet its particular character may be easily distinguished. A philologist is anxious about the history of chemistry, but he is no chemist himself: he learns the history of painting, but he does not paint: in a word, while other sciences are the sciences of things, this is the science of books.

Philology is what is now called, from the French, *belles-lettres*. In some universities it is called *humanities*. In the old sense, it was a part of grammar, and might be called the *science of words*, including *etymology*, or the *derivation of words*.

Philosopher, a *lover* or pursuer of *wisdom*, one who applies himself to the accumulation of knowledge, that is, the discovery of truth.

Philosopher's *stone*, the principal object of alchemy, a preparation which, when found, will be able to change other metals into pure gold.

Philosophy, the love or pursuit of knowledge or wisdom. In a general sense, the term philosophy includes observation and reflection on every subject; in particular senses, it applies to any peculiar study which has for its object the reason of things. The name originated with Pythagoras, who declined the title of Wise, which had been given to his predecessors, Thales, Pherecydes and others, and contented himself with the name of a "friend "or lover of wisdom."

Philosophy is of three principal kinds: 1. Intellectual or metaphysical, which treats of the Deity and of mind; 2. Physical, to which belongs every object of the senses; 3. Moral, which regards the conduct of human life.

The great end of philosophy is emancipation from error: ignorance would be no evil, were not error its inseparable accompaniment.

The origin of natural philosophy has been ably depicted by Dr. Smith. He begins with discriminating the kindred terms wonder, surprise, and admiration. Wonder, according to him, is excited by what is extraordinary and uncommon; surprise by what is familiar yet unexpected; admiration by what is beautiful or grand. Surprise is not to be regarded as a peculiar emotion of the mind, but consists wholly in the violent and sudden change produced on the current of our thoughts. The poignancy of the feeling bears a proportion to the rapidity of the transition; and it is not a little remarkable that the passage from extreme grief to extreme joy causes a more fatal shock to the mental frame, than the opposite alternation. In viewing the phænomena of the universe, the repeated sequences are imprinted on our minds, the ordinary succession of events becomes firmly associated in our conceptions, and all seem to harmonize together: but if any thing occurs apparently out of the usual course of nature, the imagination is suddenly arrested in its career; is perplexed, confounded, tortured; and during this violent agitation, this temporary derangement, it anxiously inquires for some invisible principle to connect the broken chain, to fill up the breach, to smooth the current of its conceptions. A stone was seen to fall, smoke to ascend, fire to consume; and such events, being familiar, were regarded with indifference:—but, when the sky raged in tempest, and was rent by coruscations; when the ocean heaved and laboured in his pathless bed; when the luminaries of heaven struggled in eclipse; and when the globe itself was convulsed with internal concussions:—then was the season of alarm, then was the imagination astounded and appalled. Such is the violent birth of speculation among men. In rude ages, those grand and extraordinary events were ascribed to the agency of certain divinities clothed with the attributes of human passions and human weaknesses. As society advanced, the futile expedient of prosopopœia was gradually deserted; and mankind diligently sought for some refined mechanism, to harmonize the seemingly irregular events which pass in review. The feeling of wonder was therefore the primary motive that prompted the study of philosophy, or 'the science of the connecting principles of Nature;' and, as true happiness, according to Mr. Hume, consists in that delicious repose which succeeds to the proper exercise of our faculties, philosophy is eminently qualified to promote the enjoyment of its ardent cultivators.

When two objects, however unlike, have often been observed to follow each other, and have constantly presented themselves to the sense in that order, they come to be so connected together in the fancy, that the idea of the one seems, of its own accord, to call up and introduce that of the other. If the objects are still observed to succeed each other as before, this connection, or, as it has been called, this association of their ideas, becomes stricter and stricter, and the habit of the imagination to pass from the conception of the one to that of the other, grows more and more rivetted and confirmed. As its ideas move more rapidly than external objects, it is continually running before them, and therefore anticipates, before it happens, every event which falls out according to this ordinary course of things. When objects succeed each other in the same train in which the ideas of the imagination have thus been accustomed to move, and in which, though not conducted by that chain of events presented to the senses, they have acquired a tendency to go on of their own accord, such objects appear all closely connected with one another, and the thought glides easily along them, without effort and without interruption. They fall in with the natural career of the imagination; and as the ideas which represented such a train of things would seem all mutually to introduce each other, every last thought to be called up by the foregoing, and to call up the succeeding; so when the objects themselves occur, every last event seems, in the same manner, to be introduced by the foregoing, and to introduce the succeeding. There is no break, no stop, no gap, no interval. The ideas excited by so coherent a chain of things seem, as it were, to float through the mind of their own accord, without obliging it to exert itself, or to make any effort in order to pass from one of them to another.

But if this customary connection be interrupted, if one or more objects appear in an order quite different from that to which the imagination has been accustomed, and for which it is prepared, the contrary of all this happens. We are at first surprised by the unexpectedness of the new appearance, and when that momentary emotion is over, we still wonder how it came to occur in that place. The imagination no longer feels the usual facility of passing from the event which goes before to that which comes after. It is an order or law of succession to which it has not been accustomed, and which it therefore finds some difficulty in following, or in attending to. The fancy is stopped and interrupted in that natural movement or career, according to which it was proceeding. Those two events seem to stand at a distance from each other; it endeavours to bring them together, but they refuse to unite; and it feels, or imagines it feels, something like a gap or interval betwixt them. It naturally hesitates, and, as it were, pauses upon the brink of this interval; it endeavours to find out something which may fill up the gap, which, like a bridge, may so far at least unite those seemingly distant objects, as to render the passage of the thought betwixt them smooth, and natural, and easy. The supposition of a chain of intermediate, though invisible, events, which succeed each other in a train similar to that in which the imagination has been accustomed to move, and which link together those two disjointed appearances, is the only means by which the imagination can fill up this interval, is the only bridge which, if one may say so, can smooth its passage from the one object to the other. It is hence the proper business of philosophy to tranquillize the imagination, by tracing that hidden chain which binds together the seemingly disjointed events of Nature.

Philosophy, *Cartesian*, a system of physics so called from *Rene des Cartes* its founder. By introducing geometry into physics, and accounting for natural phænomena from the laws of mechanics, he did infinite service to philosophy, and contributed to deliver it from that venerable rust, which during a long succession of ages it had contracted. To this philosopher, also, is to be attributed, in some measure, the present system of mechanical philosophy, and even that of the Newtonian. Des Cartes was a native of Bretagne in France, and born in 1596. He adopted the same principle of doubting with Socrates and Plato, as to the incomprehensibility of truth: he sets out with doubting every thing, but declares he will not always doubt; and only doubts at first that his determinations may be the purer and less encumbered.

Philosophy, *Corpuscular*, that philosophy which accounts for the phænomena of bodies by those of the minute corpuscles or atoms whereof bodies are composed. This system is exceedingly ancient, and was taught in Greece. At present, it flourishes under the name of the "mechanical philosophy."

Philosophy, *Epicurean*, the system of Epicurus. This teacher laid down, as the basis of his doctrine, that the supreme good consists in pleasure; a proposition that soon suffered a two-fold abuse. On the one hand, by misconstruction, it was regarded as a barefaced inculcation of sensuality; on the other, adopted by the luxurious, the indolent, and the licentious, as a cloke and authority for their conduct; and hence it has happened that the name Epicurean is now used in an absolute sense to designate one minutely and luxuriously attentive to his food.

Epicurus was an Athenian, and one of the greatest philosophers of his age. He is reported to have written three hundred books; but of these none are extant; and the particulars of his philosophy, which have come down to posterity, are chiefly found in the writings of Lucretius, Diogenes, Laertius, and Cicero. His system, for which he is said to have been almost wholly indebted to Democritus, consisted of three parts: canonical, physical, and etherial. The canonical regarded the rules of judging or reasoning. Epicurus was without the analytical method of division and argumentation, and is therefore censured by Cicero, who was attached to the modes and formation of the stoics. Soundness and simplicity of sense, assisted with some natural reflections, constituted all the method of Epicurus. His search after truth proceeded only by the senses, to the evidence of which he gave so great a certainty that he considered them as the first natural light of mankind.

In the second part of his philosophy he described atoms, space, and gravity, as the first principles of all things. The Deity he described as a blessed, immortal being, whose providence was rather general than particular.

With respect to the ethics or practical part of this philosophy, it has already been mentioned as the leading feature of the whole, that it places the supreme good in the enjoyment of pleasure. It follows, that the thing principally to be shunned is pain. Nature itself, said Epicurus, teaches us these truths, and prompts us from our birth to procure whatever gives us pleasure, and avoid what gives us pain. The wise man, he added, must be happy as long as he is wise; for pain, if it does not deprive him of his wisdom, cannot take away his happiness. It is in the meanings allowed to the words pleasure and pain, thus used, that every thing which is important in the morals, and doubtful in the history, of the Epicurean system is contained. According to Gassendus, the *pleasure* of Epicurus consisted in the highest tranquillity of mind, united with the most perfect health of body; blessings enjoyed only through the habits of rectitude, benevolence, and temperance: but Cicero, Horace, Plutarch, and several of the fathers of the Christian Church, represent the system in a very different point of view, The disagreement, however, is easily reconciled, if we believe one side to speak of what Epicurus taught, and the other of what many of his followers, and still more of those who took shelter under his name, were accustomed to practise.

Philosophy, *experimental*, that philosophy which proceeds on experiment and observation, and thence deduces the laws of nature and the properties and powers of bodies, and their actions upon each other. The business of experimental philosophy is to enquire into the various appearances or phænomena of nature; and to make the truth or probability thereof obvious and evident to the senses, by plain, undeniable, and adequate experiments, representing the several parts of its grand machinery and agency.

In our enquiries into nature, we are to be conducted by those rules and maxims which are found to be genuine, and consonant to a just method of physical reasoning; and these rules of philosophizing are thus enumerated by Newton, the great master of science:

1. More causes of natural things are not to be admitted than are both true and sufficient to explain the phænomenon: for nature does nothing in vain, but is simple, and delights not in superfluous causes of things; and therefore,

2. To natural effects of the same kind, the same causes are to be assigned, as far as the same may be done; as of respiration in man and beast, of the descent of stones in Europe and in America, of light in a culinary fire and in the sun, and of the reflection of light in the earth and in the planets.

3. The qualities of natural bodies which cannot be increased or diminished, and which agree with all bodies in which experiments can be made, are to be reckoned as the qualities of all bodies whatsoever: thus because extension, divisibility, hardness, impenetrability, mobility, the *vis inertiæ*, and gravity, are found in all bodies which fall under our cognizance or inspection; we may justly conclude they belong to all bodies whatsoever, and are therefore to be esteemed the original and universal proprieties of all natural bodies.

4. In experimental philosophy, propositions collected from the phænomena by induction are to be deemed, notwithstanding contrary hypotheses, either exactly, or very nearly, true; till other phænomena occur, by which they may be rendered either more accurate, or liable to exception. This ought to be done, lest arguments of induction should be destroyed by hypotheses.

These four rules of philosophizing are premised in the third book of the *Principia*, and more particularly explained in the *Optics*, where is also exhibited the method of proceeding in philosophy, the first part of which is as follows: as in mathematics, so in natural history, the investigation of difficult things, by way of analysis, ought always to precede the method of composition. This analysis consists in making experiments and observations, and in drawing general conclusions from them by induction (*i. e.* reasoning from the analogy of things by natural consequence), and admitting no objections against the conclusions, but what are taken from experiments or certain truths, and although the arguing from experiment and observation, by induction, be no demonstration of general conclusions, yet it is the best way of arguing that the nature of things admits of, and may be looked upon as so much the stronger by how much the induction is more general; and if no exception occur from the phænomena, the conclusion may be pronounced generally: but if at any time afterward any exception shall occur from experiments, it may then be pronounced with such exceptions. By this way of analysis, we may proceed from compounds to ingredients, and from motions to the causes producing them: and, in general, from effects to their causes, and from particular causes to more general ones, till the argument ends in the most general. This is the method of analysis; and that of synthesis, or composition, consists in assuming causes, discovered and established as principles, and by them explaining the phænomena proceeding from them, and proving the explanations. See ELECTRICITY, HYDROSTATICS, MECHANICS, OPTICS, PNEUMATICS, VOLTAISM, &c.

PHILOSOPHY, *mechanical*, the same with the *corpuscular*, and which explains the phænomena of nature on the principles of mechanics; that is to say, the motion, gravity, figure, arrangement, disposition, &c. of the parts which compose bodies. To this end, the mechanical powers are applied.

Philosophy, *mental*: that science which teaches us the laws of our mental frame, which shews us the origin of our various modes and habits of thought and feeling; how they operate on one another, and how they are cultivated and repressed, is called mental philosophy, or the philosophy of the human mind. The well directed study of it calls into action and improves the highest intellectual faculties, and while it employs the powers of the mind, it suggests the best means for their culture, and the best mode of their direction. It enables us to trace the intricacies of our own hearts, and points out the proper discipline for their correction. Pursued with proper views, and in a proper manner, it lays the best foundation for the highest degrees of intellectual, moral and religious improvement. An admirable view of this interesting topic will be found in Nicholson's British Encyclopedia.

Philosophy, *moral*, or Ethics, is the science which teaches men their duty, and the reasons on which it is founded. It contemplates human nature, its moral powers and connections, and from these it deduces the laws of action: it is therefore the science of manners or duty, which it traces from man's nature and condition, and shows how it terminates in his happiness. It is denominated an *art*, as it contains a system of rules for becoming virtuous and happy: it is called a *science*, as it deduces those rules from the principles and connections of our nature, and proves that the observance of them is productive of happiness. See Art. in Nicholson's British Encyclopedia, which no young person can read without becoming wiser and better. See also Paley's Moral and Political Philosophy.

PHILOSOPHY, *Peripatetic*, is that system which was taught and established by Aristotle, and maintained by his followers. It is likewise called the Aristotelian philosophy. It is divided into three distinct branches, viz. instrumental, theoretical and practical. Under the first head are included his doctrines concerning logic: under the second, his principles of physics, pneumatology, ontology and mathematics, and under the third his system of ethics and policy.

PHILOSOPHY, *Newtonian*, in its most usual sense, the doctrine of the universe, as taught by Sir Isaac Newton, who died in the year 1727. Its great principle is the power of gravity, which was rather demonstrated than discovered by this illustrious philosopher. It is also called the "*New philosophy*," in opposition to the Cartesian, the Peripatetic, and the ancient Corpuscular.

PHILOSOPHY, *Platonic*, a system of theology and morals, delivered by Plato about 350 years before Christ. Plato, it is said, laboured to re-establish natural religion, by opposing paganism. In Athens, by this philosopher, the existence of the one God was zealously inculcated; and moreover, the immortality of the soul, the resurrection of the dead, the everlasting reward of righteousness, and punishment of sin. It was Plato, too, who taught that the world was created by the *Logos* or *Word*; and that through knowledge of the Word men live happily on earth, and obtain eternal felicity hereafter. From the same philosopher, also, came the doctrine of *grace*, and the inducements to monastic life: for he pressed upon his disciples that the world is filled with corruption; that it is the duty of the righteous to fly from it, and to seek a union with God, who, alone, is life and health; that in the world, the soul is continually surrounded with enemies; and that, in the unceasing combat through which it has to struggle, it can conquer only with the assistance of God or of his holy angels.

"A happy immortality," said Plato, "is a great "prize set before us, and a great object of hope, "which should engage us to labour in the acquire- "ment of wisdom and virtue all the time of our "life."

He taught that men are incapable of praying with propriety, unless God teaches that prayer which alone can prevail; that the true happiness of man consists in being united with God, and his only real misery in being separated from him; that the soul is mere darkness unless enlightened by God; and that God is the sole cause of good, and cannot be the cause of evil, which always proceeds from human disobedience, and abuse of liberty.

In morals, he taught, that there is nothing solid and substantial but piety, which is the source of all the virtues, and the gift of God; that the love of our neighbour, which proceeds from the love of God as its principle, produces that sacred union which makes families and nations happy; that self-love produces that discord and division which reigns among mankind, and is the chief cause of our sins; that it is better to suffer wrong than to do it, that it is wrong to hurt an enemy, or to revenge an injury received; that it is better to die than to sin; and that man ought continually to learn to die, and yet to endure life with all patience and submission to the will of God.

PHILOSOPHY, *Pythagorean*, that taught by Pythagoras, who flourished 500 years before the Christian era. He described the Deity as one, incorruptible, invisible being; and differed from some of the ancients, as Epicurus, in conceiving a connection between God and man: that is, in teaching the doctrine of a superintending providence. He asserted the immortality of the soul; but in a sense essentially peculiar, and which appears to have been adopted by Plato, as it is, in part, at this day in Hindûstan.

In the cosmogony of Pythagoras, spirit, however diffused through all animals, was part of the Divinity himself, separated only by the gross forms of matter, and ready, whenever disengaged, to unite itself with the kindred essence of God: but God was only purity; and the mind recoiled from the idea of uniting with him a portion of spirit soiled with the corruption of a sinful life. The soul, therefore, once tainted, could never return to the Deity whence it emanated, till it had again recovered its innocence. After having animated a human body by which crimes had been committed, it was denied the great object of its desire, a union with its God, and forced to enter into other bodies, till at length it filled a righteous one. To this theory was added another, by means of which punishments, proportioned to its offences, were awarded: according to this, the soul of a negro-driver would pass into the body of an infant negro;

and that which in one existence plied the whip, in the other would receive the lash: the soul of the wicked would occupy the body of some animal exposed to suffering; and that of a being of few foibles undergo a sentence proportionably mild. After degrading its nature, and in consequence sinking to the least spiritual mode of animal existence, and it arose, by degrees commensurate to its merit, to the highest; thence returned to the Deity himself.—Such is the doctrine of the metempsychosis, or transmigration of souls, a leading feature in the Pythagorean system.

Whatever may be its metaphysical creed, and however erroneous it may be throughout, the great object of every system of religious philosophy is the support of virtue; and *virtue*, according to Pythagoras, consists in harmony, health, and every good thing.

The Pythagoreans studied the doctrine of numbers with great attention. They were called the *Italic sect*, because Pythagoras, after his travels, retired into the eastern part of Italy, then called the greater Greece, and there formed his school.

PHILOSOPHY, *Socratic*, the doctrines of Socrates, who flourished at Athens about 400 years before Christ, and died a martyr in the cause of natural religion against paganism. He is said to have opened the career of moral philosophy in Greece, where he preceded Plato, from the writings of which latter the philosophy of Socrates is chiefly known, for he wrote nothing himself. While other philosophers boasted of their knowledge, he laid the greatest stress upon his ignorance; asserting that he *knew nothing but this*, that he knew nothing.

Socrates led men from the contemplation of universal nature to that of themselves; a branch of philosophy insisted on by Pope, in his well known *Essay*:

"The proper study of mankind is man,"

and which was inculcated in that famous inscription, *Know thyself*.

The Socratic method of argument was that of leading an antagonist to acknowledge a proposition himself, by dint of repeated questions, in preference of that of laying it down authoritatively.

Philosophy, *Stoic*, that professed by the followers of Zeno, and so called from *stoa*, a porch or portico, under which Zeno taught. The Stoics believed in one God, whom they variously denominated; as *Mind*, *Fate*, *Jupiter*; and in the future existence of the soul. Their morality was of the magnanimous unyielding kind, formed to resist temptation to evil, and to render men callous to adversity. Wisdom they placed, where undeniably it lies, in the absence of all passion and perturbation of mind. Pain, they said, was no real evil; the man of wisdom was happy under the severest torture. The man of wisdom was always the same, and always cheerful: only he was free or rich, or fit to be acknowledged as a king or magistrate, or esteemed as a poet or philosopher. All men of wisdom were great. All things were the man of wisdom's; that is, his, [illegible] was contented with himself. Men of wisdom, [illegible] were capable of being true lovers, or friends: [illegible]ng could happen to the man of wisdom for [illegible] he was not prepared. All good things were equal, and all equally to be desired. To these, among many others, they added the maxim, that goodness can admit neither of increase nor of diminution.

Phœnicopteros, the flamingo, in natural history, a genus of birds of the order Grallæ. The Phœnicopteros rubra, or common flamingo, the only species noticed by Latham, is nearly of the size of a goose, and of the most deep and beautiful scarlet. This bird is generally found on the coast of Africa near the Cape of Good Hope. It builds its nest of mud in the shape of a hillock, and in a cavity on the top of it the female deposits two eggs on which she sits. The young ones run with great swiftness, but are unable to fly till they have nearly attained their complete growth. Flamingos subsist chiefly on small fishes, and water insects, and frequent, during the day, the borders of rivers and lakes, withdrawing at night to the high ground, and lodging amidst the long grass. They are very shy and keep together in flocks, having a vigilant centinel, by whom the slightest approaching danger is announced, by intimations which produce immediate flight.

Phœnix, a fabulous bird, which the ancients described as of the size of an eagle; its eye sparkling like stars; its head finely crested with a beautiful plumage; its neck covered with feathers of a gold colour; its tail white, and its body purple. Only one phœnix, they said, existed at the same time, and this lived in the wilderness for a space of five or six hundred years. When thus advanced in age, it built itself a pile of sweet woods and aromatic gums, in which, fire being obtained from the sun, and fanned with the wings of the bird, it voluntarily consumed itself. From the ashes, a worm was produced, which, in process of time, became a new phœnix.

In the sixth book of the "Annals of Tacitus," say the "Monthly Reviewers," it is observed that, in the year of Rome 787, the phœnix revisited Egypt, an event which occasioned much speculation among the learned. This being is sacred to the sun. Of its longevity, the accounts are various. The common persuasion is, that it lives 500 years; but, by some, the date is extended to 1461. The several eras when the phœnix has been seen are fixed by tradition. The first, we are told, was in the reign of Sesostris; the second in that of Amasis; and in the period when Ptolemy, the third of the Macedonian race, was seated on the throne of Egypt; another phœnix directed its flight toward Heliopolis. When to these circumstances are added the brilliant appearance of the phœnix, and the tale that it makes frequent excursions, with a load on its back, and that when, by having made the experiment through a long tract of air, it gains sufficient confidence in its own vigour, it takes up the body of its father, and flies with it to the altar of the sun, to be there consumed, it cannot but appear probable that the learned of Egypt had enveloped under this allegory the philosophy of comets.

Phonics, the doctrine or science of sounds, otherwise called acoustics. Phonics may be considered as analogous to optics, and like that science divided into direct, refracted, and reflected; or phonics, diaphonics, and cataphonics.

I. Sound, which is the object of phonics, may be improved with regard both to its creation, as in speaking, whistling, singing, or hallooing, and to its propagation, by the position of the sonorous body.

II. With regard to the medium of sound, phonics may be improved by its thinness and quiescency, and by the sonorous body being placed near a smooth wall, either plane or arched, especially cycloidal or eliptical (whence the theory of whispering places); as also by placing the sonorous body near water, the effect of which is to soften the sound; or on a plain, rather than on uneven ground, by which means it is conveyed to the greater distance.

III. The ear is helped by placing it near a wall, especially at one end of an arch, the sound beginning at the other, or near the surface of the water or the earth; and by instruments, as the stentorophonicon or speaking-trumpet; or by an instrument to help weak ears, by an instrument to take in very remote sounds.

Phosphates, Phosphites. See the next article.

Phosphoric acid: when phosphorus undergoes combustion in oxygen gas, a great quantity of white fumes are produced and deposited in white flakes. These are phosphoric acid, that is, a compound of phosphorus and oxygen. This acid is found in the salts which are obtained from human urine: its component parts are

Oxygen - -	60	parts
Phosphorus	40	
	100	

It combines with alkalies, earths and metallic oxydes, forming with them salts denominated PHOSPHATES. The PHOSPHOROUS acid, which contains a smaller proportion of oxygen than the phosphoric acid, is obtained by the slow combustion of phosphorus at the common temperature of the air. Phosphorous acid forms compounds with alkalies, earths and metallic oxydes, which are known under the name of PHOSPHITES.

PHOSPHORUS, a denomination given to all bodies which shine and seem to burn, without having any degree of heat. Phosphori, in general, says Lemeri, may be considered as sponges full of matter of light, which is so slightly retained, that a small force is sufficient to put it in motion, and cause it to exhale in a lucid form: thus the phosphori made by various chemical preparations receive so large a proportion of fire in the process, and retain it so well in their unctuous substance, that it may be kept there, in water, for twenty years; and in such a state that on the first laying them open to the air they shall take fire, and exhale in lucid flames. It is not however to be supposed that the fire is fixed and quiescent in the body of the phosphorus during this period of its confinement: for that it has a real motion is evident, since, in the summer season, it is seen in any dark place, fulminating and emitting flashes.

That phosphori owe their lucidity to the motion of the parts seems evident from the following reasons: 1. Several phosphori are undoubtedly owing to putrefaction, as rotten wood, very stale meat, especially veal; some sorts of fish, also stale; as oysters, lobsters, flounders, whitings, &c. which putrefaction is the effect of a slow and gentle fermentation, or intestine motion of the parts: 2. Most phosphori have their light so weak as to shine only in the dark; which seems to argue a lesser degree of velocity in the parts than that which is necessary to produce heat: because this last degree of velocity will cause bodies to shine in open day-light: 3. Some phosphori are the parts of animated bodies, as the glow-worm; but all the parts of an animal are undoubtedly in motion: 4. Other phosphori put on the appearance of flame; as the *ignis fatuus*, the writing of common phosphorus, flashes of lightning, &c. but all flame is kindled vapour, whose parts are in motion, and which may be too weak to cause burning, or even a sensible degree of heat: 5. Several of those innocent lambent flames may have their matter so agitated, or the velocity of their motion so increased, as actually to produce heat, and burn; as the writing of phosphorus on blue paper, sufficiently rubbed, will kindle into an ardent flame, and burn the paper: 6. Phosphori seem to have the essential nature of fire, because they are so easily susceptible of a burning quality from fire: thus common phosphorus is immediately kindled into a most ardent and inextinguishable flame, by means of common fire: 7. By rubbing the back of a black horse, or cat, in the dark, innumerable lucid sparks are produced: and in the same manner, the rubbing a piece of black cloth, which has been exposed to the sun, will cause it to throw the particles of light it has imbibed; whereas a piece of white cloth, which reflects most of the sun's rays, emits no such lucid flames in the dark.

Chemistry, it has been observed, has scarcely afforded any thing more surprising than the common phosphorus. To see letters traced with this matter become luminous in the dark, images of the bodies of men blaze with light, and abundance of similar phænomena, all produced by phosphorus, must awaken the curiosity of those who have seen these experiments, and render them desirous of being acquainted with its preparation. One method for that of the common phosphorus is this: evaporate any quantity of fresh urine over a gentle fire, to a black, and almost dry substance; then, with two pounds thereof, thoroughly mix twice its weight of fine sand; put this mixture into a strong coated, long-necked vessel; and having poured a quart or two of clear water into a large receiver, join the latter to the long-necked vessel, and work it in a naked fire. Let the heat be moderate for the first two hours; then increase it gradually to the utmost violence; and continue this for three or four hours successively: at the expiration of which time, there will pass into the receiver a little phlegm and volatile salt, much black and fetid oil, and lastly the matter of phosphorus, in form of white clouds, which either stick to the sides of the receiver, like a fine yellow skin, or fall to the bottom in form of a small sand. Now, let the fire go out, but let the receiver continue till all be cold, lest the phosphorus take fire on the admission of the air. To reduce the small grains into one piece, put them into a little tin ingot-mould, with water; heat the ingot, to make the grains melt together; then add cold water, till the matter is congealed into one solid stick, like bees-wax; which, being cut into small pieces, fit to enter the mouth of a phial, may be preserved by immersion in cold water, and by keeping the phial close stopped. If the glass be not stopped, the phosphorus will turn black on its surface, and at length be spoiled.

This phosphorus is employed in making curious experiments, to which an allusion has already been made. 1. Its light appears greater in vacuo than in the open air. 2. In hot weather it is observed to dart flashes of light through the water wherein it is contained; so as exactly to resemble lightning, which thus darts unextinguished through watery clouds and vapours. 3. These flashes of light are not apt to kindle or burn any combustible matter, in which they resemble the harmless kind of lightning; but in a condensed state, this phosphorus burns very furiously, and with a most penetrating fire, so as to melt and dissolve metals, in which respect it resembles lightning of the destructive kind, which is found to have the same effect. 4. If a small piece of this phosphorus be viewed through a microscope, the internal parts appear in a state of constant ebullition. 5. Though this phosphorus appears to be a kind of sulphur, it does not dissolve in highly rectified spirit of wine, but only communicates some sulphureous parts thereto: for if this spirit be poured into water in the dark, it yields a faint degree of light. 6. This phosphorus being mixed with a large quantity of pomatum, makes a shining unguent, which may be rubbed on the hands and face, without danger of burning, so as to render them luminous in the dark: an experiment that has sometimes been employed by thoughtless persons for the sake of mischievously terrifying those not *prepared* for the sight. Other artificial phosphori are made from alum and wheat flour, and from sal ammoniac and lime.

Phosphurets, are substances formed by an union with phosphorus, thus we have the phosphuret of carbon, which is a compound of carbon and phosphorus: we have also the phosphuret of lime, &c.

Phosphuretted *hydrogen*, is phosphorus dissolved in hydrogen gas, which when it comes in contact with common air burns with great rapidity, and if mixed with that air it detonates violently. Oxygen gas produces a still more rapid combustion than common air. When bubbles of it are made to pass up through water, they explode in succession as they reach the surface of the liquid, and a beautiful column of white smoke is formed. This gas is the most combustible substance known. Its combustion is the combination of its phosphorus and hydrogen with the oxygen of the atmosphere, and the products are phosphoric acid and water.

Photometer, an instrument intended to indicate the different quantities of light, as in a cloudy or bright day, or between bodies illuminated in different degrees. With the help of a photometer it is said we might compare the action of the rays of light in different countries, of which some dart with sufficient constancy from a fine and serene sky, while others seem to be covered with a veil, which dims and obscures their lustre.

Phryganea, in natural history, a genus of insects of the order Neuroptera, of which there are nearly sixty species. One of the largest species is the Phryganea grandis, which is an insect of about an inch in length. The larva of this insect is known by the name of cadew-worm, and is frequently used by anglers as a bait. When arrived at full growth it fastens its case or tube by several silken filaments to the stem of some water plant, or other convenient substance, in such a manner as to project a little above the surface of the water, and casting its skin, changes to a chrysalis of a lengthened shape, and displaying the immature limbs of the future phryganea, which in a fortnight emerges from its confinement.

Physeter, the cachalot, in natural history, a genus of mammalia of the order cete. There are four species: the Physeter macrocephalus, or the spermaceti whale, grows to the length of sixty feet, and the head is nearly one third of the bulk of the whole animal. It is one of the most difficult of all the whales to be taken, and survives for several days the deepest wounds given it by the harpoon. Its skin, oil, and tendons are all converted by the Greenlanders to some valuable purpose. The spermaceti is found in the head. Ambergris is obtained from the fœces of the animal. The origin of this substance had long baffled the curiosity of the naturalist, but is now unquestionably ascertained.

Physics, a term made use of by Dr. Keil and others for natural philosophy, explains the doctrine of natural bodies, their phenomena, causes and effects. Under the general term physics is included all the branches of natural and experimental philosophy.

Physiognomy, a word formed from the Greek, which strictly signifies a *knowledge or opinion of nature*, and which is applied to an enquiry into the internal qualities of things by means of their outward appearance. In a confined sense, physiognomy is an enquiry into human dispositions and talents, as supposed to be indicated by the features of the face.

That every production of nature is marked with appearances truly expressive of its qualities, that is, that every quality has its appropriate appearance, and that therefore where the latter is observed the former may be believed to exist, are, it should seem, truths that no man of reflection will dispute; but how far any individual is capable of discovering the connection is wholly a different question. Here, every thing depends upon the degree of information possessed with respect to the thing upon which judgment is to be passed; and every man is qualified to judge exactly in proportion to the sum of his experience.

Of the human passions all men are competent judges: hence no man will mistake a face of joy for one of sorrow, nor the features of malevolence for those of kindness; but to detect hypocrisy, or measure talents, requires information of an infinitely wider range. On the whole, then, it will be understood, that it is the truth of physiognomy itself, not that of any particular physiognomical observation, that is here argued.

No study, says Lavater, mathematics excepted, more justly deserves to be termed a science than physiognomy. It is a department of physics, including theology and belles-lettres; and in the same manner with these sciences may be reduced to rule. It may acquire a fixed and appropriate character; it may be communicated and taught.

Truth or knowledge, explained by fixed principles, becomes science. Words, lines, rules, definitions, are the media of communication. The question, then, with respect to physiognomy, will thus be fairly stated: can the striking and marked differences which are visible between one human face, one human form, and another, be explained, not by confused and obscure conceptions, but by certain characters, lines, and expressions? are these signs capable of indicating the vigour or imbecility, the sickness or health, of the body; the wisdom, the folly, the magnanimity, the meanness, the virtue or the vice, of the mind?

It is only to a certain extent that even the experimental philosopher can pursue his researches. The active and vigorous mind, employed in such studies, will often form conceptions which he shall be incapable of expressing in words so as to communicate his ideas to the feebler mind, which was itself unable to make the discovery; but the lofty, the exalted mind, which soars beyond all written rule, and possesses energies reducible to no law, must be pronounced unscientific. It will be admitted, then, that to a certain degree, physiognomical truth may as a science be defined and communicated. Of the truth of the science there cannot exist a doubt. Every countenance, every form, every created existence, is individually distinct, as well as different, in respect of class, race, and kind. No one being in nature is precisely similar to another.

This proposition, in so far as it regards man, is the foundation-stone of physiognomy.

On the connection between this science and the happiness of man, which is the end of all science, Lavater observes, that the tenets that knowledge and science are detrimental to man, and that a state of rudeness and ignorance would be preferable, are now justly exploded. They do not merit serious opposition. The extension and increase of knowledge then is an object of importance to man; and what object can be so important as the knowledge of man himself? If knowledge can influence his happiness, the knowledge of himself must influence it most. This useful knowledge is the peculiar province of the science of physiognomy. To conceive a just idea of the advantages of physiognomy, let us for a moment suppose that all physiognomical knowledge were totally forgotten among men: what confusion, what uncertainty, what numberless mistakes would be the consequence? Men, destined to live in society, must hold mutual intercourse: the knowledge of man imparts to this intercourse its spirit, its pleasures, its advantages.

Physiognomy, he adds, is a source of pure and exalted mental gratification. It affords a new view of the perfection of Deity; it displays a new scene of harmony and beauty in his works; it reveals internal motives, which without it would only have been discovered in the world to come. The physiognomist distinguishes accurately the permanent from the habitual, the habitual from the accidental, in character. Difficulties, no doubt, attend the study of this science. The most minute shades, scarcely discernible to the unexperienced, often denote total opposition of character. A small inflexion, diminution, lengthening, or sharpening, even though but of an hair's-breadth, may alter in an astonishing degree the expression of countenance and character. How difficult then, how impossible indeed, must this variety of the same countenance render precision! The seat of character is often so hidden, so masked, that it can only be detected in certain, perhaps uncommon, positions of countenance. These positions may be so quickly changed, the signs may so instantaneously disappear, and their impression on the mind of the observer may be so slight, or these distinguishing traits themselves so difficult to seize, that it shall be impossible to paint them, or to describe them in language. Innumerable great and small accidents, whether physical or moral, various incidents and passions, the diversity of dress, of position, of light or shade, often tend to display the countenance in so disadvantageous a point of view, that the physiognomist is betrayed into an erroneous judgment of the true qualities and character. Such causes often occasion him to overlook the essential traits of character, and to form a decision on what is purely accidental.

Physiology, a Greek word, strictly signifying discourse on nature; but usually confined to that branch of physical science which treats of the different functions and properties of living bodies; that is, of bodies which grow and reproduce their kind: a definition which includes vegetables and animals.

It is distinct from physics in general, inasmuch as it regards organized bodies alone: and from metaphysics, inasmuch as it does not presume to treat of mind. Physiology is, in effect, what Dr. Darwin has called "zoonomia, or the laws of organic life."

The functions of animal life are not only more complicated in the same individual than those of vegetation, but also more diversified in the different classes into which animals are divided: so that the physiology of each class has its peculiar laws. A considerable portion of the bulk of all animals is composed of tubular vessels which originate in a heart: the action of the heart propels through the arteries with the assistance of their own muscular powers, either a colourless transparent fluid, or a red blood, into the extremities of the veins; through which it again returns to the origin of motion. The process for supporting life by nutrition begins with the mastication of the food, which has been received into the mouth. The food, thus prepared, is conveyed into the stomach by the operation of swallowing. In the stomach it undergoes digestion, and being mixed with the bile and other fluids poured in by the liver and the neighbouring glands, it becomes fit for affording chyle, which is separated from it by the absorbents of the intestines, in its passage through the convolutions of a canal nearly forty feet in length. Together with the chyle, all the aqueous fluids, which are swallowed, must also be absorbed, and pass through the thoracic duct into the large veins entering the heart, and thence into general circulation, before they can arrive at the kidneys, by which the superfluous parts are rejected. The chyle passes unaltered with the blood, through the right auricle and ventricle of the heart, and enters the lungs, to be there more intimately mixed with it, and perhaps to be rendered animal and vital. Here the blood receives from the air a supply of oxygen, emits some carbonic matter, and is rendered arterial. Returning to the left side of the heart, it is distributed to every part of the system, supplying nutriment throughout, while the glands and arteries secrete from it such fluids as are required for particular purposes, subservient to the animal functions. From these processes heat is probably evolved. The muscles are supposed to be furnished by the blood, with a store of that unknown principle, by which they are rendered capable of contracting, or producing motion, in obedience to the influence transmitted by the nerves from the sensorium. The brain and nervous system are also sustained, by means of the vascular circulation, in a fit state for transmitting the impressions, made by external objects on the senses to the immediate seat of thought and memory, in the sensorium; and for conveying the dictates of the will to the muscular parts of the whole frame. When all the functions of animal life are carried on in their perfect and natural manner, the animal is said to be in health: when they are disturbed, a state of disease ensues. Diseases have been divided into four classes: 1. Febrile diseases, which constitute the first class, consist principally in an increase of the frequency of the pulsations of the heart and arteries, together with an elevation of the temperature, the whole animal being, at the same time, in some measure impaired. 2. The incapacity of a part to perform its functions upon the application of a natural stimulus, or the incapacity of the nerves to transmit to it the dictates of the mind, constitutes palsy: such derangements, and others, by which the actions of the nervous system are peculiarly impaired, form the *second* or nervous class, including spasmodic affections, madness, melancholy and epilepsy. 3. A general derangement of the system, without fever, or any peculiar debility of nerves, constitutes the *third* class, such as atrophy, consumption, scrofula, and dropsy. 4. The fourth class consists of local affections only, as blindness, deafness, tumors, and luxations.

Piazza, an Italian name for a portico or covered walk. The word literally signifies a broad open place or square; whence it came to be applied to the walks or porticoes surrounding them.

Pica, in letter-foundery, the name of a size of printer's types.

Picæ. See Ornithology.

Pict's-*wall*, in antiquity, a wall begun by the emperor Adrian, on the Northern boundaries of England, to prevent the incursions of the Picts and Scots. It was first only made of turf, strengthened with palisadoes, till the Emperor Severus built it with stone. This wall extended from the entrance of Solway Frith, in Cumberland, to the German ocean.

Picus, the wood-pecker, in natural history, a genus of birds of the order Picæ. The birds of this genus, of which there are fifty species, live chiefly on insects, to obtain which they climb trees, and are perpetually in search of those crevices in which their food is lodged. Their whole existence seems to be spent in search after food: doomed to this perpetual occupation, wood-peckers avoid society, and appear to possess none of the animation of cheerfulness, or vigour of courage. They have no notes but such as are expressive of pain and sadness, and lead a life of labour and restlessness. They destroy trees by the cavities which they make in them in search after their food.

PIECE, in the military art, a name given to every description of fire arms, the pistol, perhaps, excepted. Battering pieces are the larger sort of guns, used at sieges for making the breaches; such are the twenty-four-pounder and culverine, the one carrying a twenty-four and the other an eighteen pound ball. Field-pieces are twelve pounders, demi-culverines, six pounders, sakers, minions, and three pounders, which march with the army, and always encamp behind the second line, but in the day of battle take the front.

PIEPOUDRE, the name of a court of record, incident to every fair or market, and of which the steward of him who has the toll of the market is the judge. According to the most satisfactory derivation, the term implies that the court is that of pedlars or petty chapmen, who assemble on those occasions. It was instituted to administer justice for all commercial injuries done in that very fair or market, and not in any preceding one; so that the injury must be done, complained of, heard, and determined, within the compass of one and the same day, unless the fair continues longer. The court has cognizance of all matters of contract that can possibly arise within the precinct of that fair or market; and from its decision there lies a writ of error, in the nature of an appeal, to the courts at Westminster.

Pier, in architecture, any intervening mass of building; as between windows, or between the arches of a bridge; and also a mass opposed by way of fortress against the force of the sea, or a great river.

Pigments, substances used in painting and dyeing, to impart the colours required. They are obtained from animal, vegetable, and mineral substances.

Pile, in coinage, denotes a kind of puncheon, which in the old way of coining with the hammer, contained the arms, or other figure and inscription, to be struck on the coin. We still call the arms side of a piece of money the Pile, and the head the Cross, because, in ancient coins, a Cross usually took the place of the head.

Pilgrimage, a journey to any given place, undertaken from pious motives. The pilgrimages of Christian devotees began about the middle ages of the church; but they were most practised after the end of the eleventh century. In the year 1428, a considerable number of licences were granted by Henry VI. empowering captains of ships to carry pilgrims to the shrine of St. James of Compostella in Spain; and there went from London 280, from Bristol 200, Weymouth 122, Dartmouth 90, Yarmouth 60, Jersey 60, Plymouth 40, Exeter 30, Poole 24, Ipswich 20; in all, 926 persons.

Pilot, in a general sense, the person who superintends the navigation, either along the sea coast, or upon the main ocean; in a more strict sense, a pilot is one whose profession it is to direct a ship's course when near the coast, and into the roads, bays, rivers, havens, &c. within his peculiar district. Pilots taking upon them to conduct any ship from the English channel to any place up the river Thames, are to be first examined and approved by the master and wardens of the society of the Trinity-House, under pain of heavy fines: they are likewise subject to the government of that corporation, and pay ancient dues, out of their wages, not exceeding one shilling in the pound, for the use of the poor thereof.

Pin, in commerce, the root of the Saxon *pindan*, to include, shut, or fasten, a little peg of brass wire. The following account of the manufacture of this assistant in clothing, is given by Ellis: When the brass wire of which the pins are formed is first received at the manufactory, it is generally too thick for the purpose of being cut into pins: the first operation, therefore, is that of winding it off from one wheel to another with great velocity, and causing it to pass, between the two, through a circle in a piece of iron of smaller diameter. The wire being thus reduced to its proper dimensions, is straitened by being drawn between iron pins, fixed in a board in a zig-zag manner, but so as to leave a direct line between them. After this, it is cut into lengths of three or four yards, and then into smaller ones, every one of which latter being sufficient to make six pins: each end of these is ground to a point, which was performed, when I saw the manufactory, by boys, who sat each with two small grinding-stones before him, turned by a wheel. Taking up a handful, the boy applies the ends to the coarsest of the two stones, being careful at the same time to keep each piece moving round between his fingers, so that the points may not become flat: he then gives them a smoother and sharper point, by applying them to the other stone, and by that means a lad of 12 or 14 years of age is enabled to point about sixteen thousand pins in an hour. When the wire is thus pointed, a pin is taken off from each end, and this is repeated till it is cut into six pieces. The next operation is that of forming the heads, or, as it is termed, *head-spinning*, which is done by means of a spinning wheel, one piece of wire being thus with astonishing rapidity wound round another, and the interior being drawn out, leaves a hollow tube between the circumvolutions: it is then cut with sheers; every two circumvolutions or turns of the wire forming one head; these are softened by throwing them into iron pans, and placing them in a furnace till they are red-hot. As soon as they are cold, they are distributed to children, who sit with anvils and hammers before them, which they work with their feet by means of a lathe; and taking up one of the lengths, they thrust the blunt end into one of the quantity of heads which lie before them, and catching one at the extremity, they apply it immediately to the anvil and hammer, and by a motion or two of the foot, the point and the head are fixed together in much less time than it can be described, and with a dexterity only to be acquired by practice; the spectator being in continual apprehension for the safety of their finger's ends. The pin is now finished as to its form; but still it is merely brass; it is therefore thrown into a copper, containing a solution of tin and lees of wine. Here it remains for some time; and when taken out, assumes a white, though dull appearance: in order therefore to give it a polish, it is put into a tub containing a quantity of bran, which is set in motion by turning a shaft that runs through its centre, and thus by means of friction it becomes perfectly bright. The pin being complete, nothing remains but to separate it from the bran, which is performed by a mode exactly similar to that of winnowing corn: the bran flying off, and leaving the pin behind, fit for immediate sale.

Pinchbeck. See Zinc.

Pinna, a shell-fish, which produces pearls of different colours; as gray or lead coloured, red, and some of a blackish colour, and in the form of a pear.

Pinion, in mechanics, a spindle, in the body of which are several notches, which catch the teeth of a wheel that serves to turn it round: or it is the lesser wheel which plays in the teeth of a larger.

Pinion *of report*, is that pinion in a watch, which is commonly fixed on the arbor of a great wheel; it drives the dial-wheel, and carries about the hand.

Pinnace, a small vessel, navigated with oars, and having generally two masts, which are rigged like those of a schooner.

Pint, a measure used in estimating liquids, and sometimes even dry things. It is the eighth part of a gallon. The wine pint of pure water weighs nearly seventeen ounces, the ale pint contains more than twenty ounces. The Scotch pint is equal to three English pints.

Pioneers, in military economy, labourers preceding an army in its march, and employed in mending the ways, working on intrenchments and fortifications, and in making mines and approaches. Most of the foreign regiments of artillery have half a company of pioneers. In England, every regiment of infantry and cavalry has three or four pioneers, each of whom is provided with an axe, a saw, and apron, a cap with a leather crown, and a black bear's-skin front, on which is the king's crest in white, on a red ground, and the number of the regiment on the back part of it.

Pipe, denotes a measure for wine, and other things measured by wine-measure. It is usually reckoned two hogsheads or 126 gallons: this is the measure as is given in books, but in fact the pipe differs with almost every kind of wine.

	Gallons.
The pipe of Port is	138
——— Madeira	110
——— Vidonia	120
——— Sherry	130
——— Lisbon	140

The pipe of Port is seldom accurately 138 gallons, and it is customary in trade to charge what the cask actually contains, be it more or less than the estimated quantity.

Piracy, in law, a word which includes all those acts of robbery and depredation committed at sea, which if occurring upon land would be called felonies; and all acts of hostility committed against the state or individuals of the country in which the offender was born.

Pistil. See **Botany**.

Pisces, in natural history, is the fourth class in the Linnæan system. See Ichthyology. This branch of natural history is much more imperfectly understood than the others, owing to the circumstance of the animals of which it treats inhabiting the watery element, with which we must necessarily be in a good measure unacquainted. The general form and structure of fishes is beautifully adapted to the peculiarity of their situation. Being nearly of the same specific gravity as the water which they inhabit, their small fins only are requisite to enable them to move with ease, and steer their course at pleasure. The orders of the fishes are chiefly taken from the situation of the fins, though the first order, or "apodes," is so named because the animals of it have no fins. The pectoral, and more particularly the ventral fins, serve to raise and depress the fish: when the fish desires to have a retrograde motion, a stroke forward with the pectoral fin effectually produces it: if the fish desire to turn either way, a single blow with the tail, the opposite way, sends it round at once; if the tail strike both ways in succession, the motion produced by the double lash is progressive, and enables the fish to dart forward with astonishing velocity. Fishes have the organs of sense, some of them probably in a very high degree, and others imperfectly: of the latter kind are the senses of touch and taste: the sense of hearing, the existence of which was formerly doubted, is now completely ascertained: the organ is found to be situated in the head. The organ of smelling is large, and the animals have a power of contracting and dilating the entry to it as they have occasion. By their acute smell they are supposed to discover their food. The sight of fishes is the most perfect of their senses, and is perhaps, the only one that, from the peculiarity of their situation, they necessarily have occasion for. With respect to the food of fishes: they are mostly carnivorous, though they will seize upon almost any thing that comes in their way, and not unfrequently devour their own offspring: they seem to manifest a predilection for whatever they can swallow possessed of life. The life of a fish from the smallest to the greatest is but one continued scene of hostility and violence. The smaller species, which stand no chance in the unequal combat, resort to those shallows where the larger are unable to approach. There they become invaders in their turn, and live on the spawn of large fishes, which they find floating on the water, till at length they are imprisoned, and leisurely devoured by the mussel, oyster, &c. which lie in ambush at the bottom. Notwithstanding their natural voracity, fishes can live long apparently without food; and to account for this it has been supposed they feast on insects too small for the human eye to see, or that they have the power of chemically decomposing water. The astonishing fecundity of almost every kind of fish must not be forgotten. The roe of a carp eighteen inches long was found to weigh 4752 grains: now it required 72 eggs of this roe to make up the weight of one grain, hence the roe of this fish contained 342,144 eggs; many other fish are known to be equally prolific. The intention of so great an increase is certainly to furnish food for man, for many of the feathered tribe, for thousands of their own kind and yet to allow enough of each species to remain for its preservation.

Piston, a short cylinder of metal, or other solid substance, fitted exactly to the cavity of the barrel of the pump. There are two kinds of pistons used in pumps, the one with a valve, and the other without a valve, called a forcer. See **Pump**.

Pitch, a tenacious oily substance, chiefly drawn from pines and firs, and used to preserve wood from water, and for other purposes.

Place, in military economy, a general name for all sorts of fortresses. 1. "A strong or fortified place," is one flanked and covered with bastions: 2. "A regular place," one whose angles, sides, bastions, and other parts, are equal: and this is usually denominated from the number of its angles: as a pentagon, or an hexagon: 3. "An irregular place" is one whose sides and angles are unequal: 4. "Place of arms," is a strong city or town pitched on for the chief magazine of an army; or, in a city or garrison, a large open spot of ground, usually near the center of the place where the grand guard is commonly kept, and the garrison holds its rendezvous at reviews, and in cases of alarm to receive orders from the governor: 5. "Place of arms of an attack," in a siege, a spacious place covered from the enemy by a parapet or epaulement, where the soldiers are posted ready to sustain those at work in the trenches against the garrison: 6. "Place of arms particular," in a garrison, a place near every bastion, where the soldiers sent from the grand place to the quarters assigned them relieve those that are either upon the guard or in fight: 7. "Place of arms without," a place allowed to the covered way for the planting of cannon to oblige those who advance in their approaches to retire: 8. "Place of arms, in a camp," a large space at the head of the camp for the army to be ranged in, and drawn up in battalia; and also a place for each particular body, troop, or company to assemble in.

Place, *Common.* See Common-*place.*

Plagiary, in philology, the act of him who uses the works of another man as his own. In Rome, Plagiarus was one who bought, sold, or retained a freeman as a slave; and was so called because he was condemned *ad plagas*: "to be whipped." In transferring the word to literary matters, the idea of assuming a false claim to property is obviously preserved. The difference between plagiary and quotation is very manifest; the former being acknowledged. "Dictionary-writers," says Chambers, 'at least such as meddle with arts and sciences, seem exempted from the common laws of *meum* and *tuum*; they do not pretend to set up on their own bottom, nor to treat you at their own cost. Their works are supposed in a great measure to be other people's; and what they take from others, they do it avowedly, and in the open sun. In effect, their quality gives them a title to every thing that may be for their purpose, wherever they find it: and if they rob, they do it not any otherwise than as the bee does, for the public service. Their occupation is not pillaging, but collecting contributions; and if you ask them their authority, they will produce you the practice of their predecessors of all ages and nations."

Plan, in general, denotes the representation of something drawn on a plane; as maps, charts, and ichnographies. In a particular sense, the word *plan* is used for an ichnography, or ground-plan; being a draught of a building, as it appears, or is intended to appear, on the ground; showing the extent, division, and distribution of its area or ground plot into apartments, rooms, &c. A geometrical plan is that wherein the solid and vacant parts of a building are represented in their natural proportions. The raised plan of a building is the same with what is otherwise called an *elevation* or *orthography*. A perspective plan is that exhibited by degradations or diminutions, according to the rules of perspective. To render plans intelligible, it is usual to distinguish the massives or solid parts, as the walls, with a blackish wash; the projections on the ground by drawing them in full lines; and those supposed above them by drawing them in dotted lines. The augmentations or alterations to be made are distinguished by a colour different from what is already built; and the tints of each plan are lighter as the story is raised. In large buildings, it is usual to have three several plans for the three first stories.

Planet, in astronomy, a word sometimes used for each of the principal celestial bodies seen from the earth; in which lax sense, the sun is often so denominated, and the earth excluded: but, properly, the planets are those bodies which move round the sun, and which, with respect to the fixed stars, continually changing their position, have been called by this Greek name, signifying "wanderers."

The planets are usually distinguished into primary and secondary. The primary, called, by able to examine, invariably produces it under every form, and in every situation. In the words of the poet, "full nature teems with life;" and it would be strange to believe that the vast celestial system, is, in this respect, a dead, infertile blank. It is rational, surely, to consider the sun itself as an inhabited world, in regard to which all the planets are satellites.

The appearance of the several planets, when viewed from each other, is of course very different from that which is presented to the inhabitants of any one that can be named. Distant ninety millions of miles from the sun, the Earth, twenty-five thousand in circumference, seen from that body, appears a point hardly visible to the eye; and were the whole space included within the circle that the earth describes in moving round the sun, one solid body, that body also, of which the sun would make only a small part, would, if viewed from the nearest *star*, seem but a mere point.

To Mars, the Earth and its Moon must seem two moons, a greater and a less; changing places with each other; and appearing sometimes horned, sometimes half or three quarters illuminated, but never full. Their distance from each other, also, two hundred and forty thousand miles, must seem hardly fifteen. The Earth, from that station, must resemble, in size, Venus, as seen from ours.

Astronomers are of opinion that Jupiter experiences no sensible change of seasons: and they consider this as a necessary ordination of the Deity: for, say they, if it were not exactly as it is, a considerable number of degrees round each of its poles would in turn continue during nearly six earthly years in darkness; and as each degree of a great circle on Jupiter contains, at a mean rate, seven hundred and six of our miles, it is easy to judge what vast tracts of land would, by a difference of its position, be rendered uninhabitable. To this planet, the sun presents a bulk equal only to a twenty eighth part of that of which he appears to us. The light and heat it receives from it are supposed to be in proportion; and a compensation in these respects afforded it by its four moons. By one or more of these it is illuminated, its poles excepted, during its whole night. From its poles, only its farther moons can be seen; but there, it is conjectured, their light is not necessary; because the sun constantly circulates in or near the horizon, and is very probably kept in view of both poles by the reflection of the atmosphere. Jupiter, viewed from its nearest moon, appears a thousand times as large as the Earth's moon does to us, changing all its phases in every period of forty-two hours and a half.

On one side of the vast ring or circle which surrounds Saturn, the sun shines during almost fifteen earthly years together, and as many on the other in its turn; so that the ring, if the axis of the planet has no inclination to this body, is visible to the inhabitants for almost fifteen years, and as long invisible by turns: but if the axis be inclined to the ring about thirty degrees, it will appear once every earthly day to all the inhabitants within thirty degrees of the equator on both sides, frequently eclipsing the sun during the Saturnian time of light.

This ring, seen from its planet, appears a vast luminous arch in the heavens; and, twenty-nine thousand miles in breadth, and twenty-one distant from the surface, it can scarcely be conceived by the inhabitants to be an appendage to their world. When we see the ring most open, its shadow on the planet is broadest; and from that epoch, the shadow grows narrower, as the ring appears to do to us, until, by the annual motion of the planet, the sun comes to the plane of the ring, or even with its edge, which being then directed toward us, becomes invisible on account of its thinness.

The several primary planets are sometimes expressed by the following characters:

1. Mercury ☿
2. Venus ♀
3. Earth ⊖
4. Mars ♂
5. New Planets.
6. Jupiter ♃
7. Saturn ♄
8. Georgium Sidus ♅

To convey some idea of the space occupied by the planetary or solar system, if, indeed, the idea of space so vast be capable of comprehension sufficiently clear to have its due effect on the mind, it may be observed that the sun, which occupies so small a portion of that space, is a million times larger than the earth. Huygens, one of the most expert astronomers of the last century, calculated the time in which a cannon-ball would run over the space between the earth and the sun, and between the sun and the upper planets, and thence to the fixed stars; and offers experiments to prove that it runs the first hundred fathom in a second. Continuing to move with the same velocity, it will traverse three leagues in a minute, one hundred and eighty in an hour, and four thousand three hundred and twenty in a day; and therefore, judging upon astronomical principles of the several distances required, and dividing them by the space so over-run in a given time, this philosopher concludes that the ball must take up twenty-five years in passing from the sun to the earth; one hundred and twenty-five in passing from the sun to Jupiter; and two hundred and fifty in reaching Saturn. But, how astonishing soever these distances may be, they are trivial compared with that of the fixed stars. Those bodies, which appear only as points in the firmament, and of which millions of millions escape our sight, are doubtlessly the centres of systems, suns, round which planets revolve. What then must be their distance, since all this multitude of suns shed so small a portion of light on the planet to which we belong? The astronomer already quoted, judged that the nearest is farther from us, by twenty-seven thousand, six hundred and sixty-four times, than we are from the sun! Upon this calculation it would follow, that the cannon-ball, travelling as before supposed, that is, at the rate of four thousand three hundred and twenty leagues a day, would take up six hundred and twenty-one thousand, six hundred and sixty years, that is, nearly seven hundred thousand years, in going to that star: that star, meanwhile, is perhaps as distant, or more so, from any other stars, as from the sun. See Solar System.

Plant, in physiology, a general name for vegetables. A plant is an organical body, destitute of mind and loco-motion, adhering to another body in such a manner as to draw from it its nourishment, and capable of reproducing its kind. Plants have become, within the fifty years last past, the subjects of much novel speculation. Linnæus had given a sexual system of reproduction, and not content with observing an analogy between animal and vegetable life in the means of reproduction, subsequent theorists have gone on to imagine intellectual attributes, and animal enjoyments. The source of these whimsical opinions appears to consist in a confused idea of animal life. Some persons have defined plants to be "destitute of sense and spontaneous motion;" but this definition it is granted is not correct. Plants afford many instances of their "sense and spontaneous motion;" but can any one be produced of their reflection? Perception, in a certain sense, is allowed them; but do they accumulate perceptions, do they remember them, compare, and combine them? To attribute what we understand by the term animal life to plants, because they are capable of perceptions and motions, is, surely, carrying the matter too far. If we hold a sheet of paper to the fire, it will immediately endeavour to reach it, exhibit motion, and alter its form. The paper, therefore, is evidently alive, and only needs a philosopher to analyse its sympathies and its antipathies? If we would distinguish in ourselves what is mechanical, what is instinctive, and what is the result of thought, we should probably find the functions of mechanical life alone sufficient to account for all the phenomena of plants. What is there, we may confidently ask, in the whole history of vegetation, that may not be explained upon the principles of chemical attraction?

Lord Kaimes relates an instance of a plane-tree, that, growing on the top of a wall, and straitened for nourishment in that barren situation, directed its roots down its side, till they reached the ground, ten feet below; and "now, (he adds) the nourishment it afforded to those roots during the time of descending is amply repaid." There is nothing surely in this phenomenon, the explanation of which may not be deduced from the most familiar properties of matter. If, as his lordship seems to have supposed, the roots pushed toward the ground were really, during the whole time of their descent, an unproductive expense sustained by the trunk, branches, and leaves, we might even then believe that the attraction between the earth and the roots was sufficient to draw down the latter to their place of nourishment; we might even believe that the superior parts of the plant, thus drained by the inferior, might absorb from the atmosphere a proportionably greater quantity of food, and that if that atmosphere was sufficiently humid, all might do well: but, do not the common principles of vegetation teach us to believe they would gain their own nourishment, that they would themselves absorb from the wall, that wall itself a means of attraction, and perhaps coated with some earthly particles, and from the atmosphere itself, the means of expanding their parts, and that, in proportion to that expansion, so would be the quantity of the food absorbed? So far then from the growth of the roots being an unproductive waste of the plant, submitted to upon the principles of prudence, as would be insinuated (as men venture their funds with the prospect of gain), it seems reasonable to believe that the roots performed, during the whole period of descent, their usual sustaining functions, though not with that abundance of success that would have attended them in a more favourable situation.

"Whatever," says a very worthy prelate, in his *Chemical Essays*, "can produce any effect upon an animal organ, as the impact of external bodies, heat and cold, the vapours of burning sulphur, of volatile alkali, want of air, &c. are found to act also on the plants called *sensitive*." Here it is evident, that the larger portion of plants are out of the question; and it would perhaps be eminently decisive, if the several substances of plants called *sensitive*, and of plants the least endued with any similar quality, were subjected to accurate chemical analysis, or if the anatomy of their pores, and the structure of their fibres, could be sufficiently examined; but the main consideration is, the facts of sensation being readily admitted, whether we are thence to infer a capability of enjoyment? "The bottom of the sea," says Dr. Percival," "is overspread with plants of the most luxurious magnitude; immense regions of the earth are covered with perennial forests; nor are the Alps, or the Andes, destitute of herbage, though buried in deeps of snow; and can it be imagined that such profusion of life subsists without the least sensation or enjoyment!" Enjoyment cannot have place where consciousness is not: whether plants have consciousness, therefore, is the point at issue: for that animal and vegetable organs may resemble each other in their material nature, is a proposition that ought not, one would think, to startle the chemical philosopher.

"Now," continues the bishop, "to refer the muscular motions of shell-fish and zoophytes to an internal principle of volition, to make them indicative of the perceptivity of the being, and to attribute the more notable ones of vegetation to certain mechanical dilatations and contractions of parts occasioned by external impulse, is to err against that rule of philosophizing which assigns the same causes for effects of the same kind. The motions are equally accommodated to the preservation of the being to which they belong, are equally distinct and uniform, and should be equally derived from mechanism, or equally admitted as criterions of perception."

In quoting this passage, the fullest justice is intended to be done to the side of the argument it espouses; for it appears to contain the clearest and most forcible defence that has been offered. In quoting it, however, the opinion of the writer coincides with the first alternative it proposes—that of deriving many of the motions of animals, as well as of vegetables, equally from mechanism. It is necessary at the same time to observe, that it appears rather unfair to throw the muscular motions of shell-fish and zoophytes into one general class; since much that may be true of some of those motions, and of some of those animals, may not be so of others.

Planting, in rural economy, a word more particularly used for the planting of trees in woods and forests. According to an estimate made by Dr. Watson a few years since, a thousand acres of land may be inclosed at an expense of six shillings per acre, and five hundred larches, two feet in height, may be planted on each acre for fourteen shillings;

so that a plantation of five hundred thousand larches may be planted on a thousand acres of land for one thousand pounds; and, supposing them to remain for sixty years, he calculates that the profit of such a plantation would amount to the sum of one hundred and fourteen thousand, four hundred pounds.

Plaster-of-Paris, a preparation of several species of gypsum dug near Mont-Maitre, a village in the neighbourhood of Paris, from which city it takes its name. The use of this substance, in imitating works of sculpture, is well known. Plaster-of-Paris is used as a manure in Pensylvania. The best kind is imported from hills in the vicinity of Paris. It is brought down the Seine, and exported from Havre-de-Grace.

Plastic, a formative power, or a faculty of forming or fashioning a mass of matter into a stone, vegetable, or animal; whence the phrases, *plastic nature*; and *the plastic art*.

Plate, vessels of gold or silver, from the Spanish word "plata," signifying "silver;" but which application of the word seems itself to be derived from the practice of forming silver into flat articles for the table.

Plate, is also a term used for a prize at horse-racing.

Platinum, a metal only found in South-America, and unknown in England before the year 1741. In beauty, scarcity, ductility, and indestructibility, it is considered as not inferior to gold and silver, and in other qualities far their superior. When pure, it is of a white colour, like silver, but not so bright. To its colour it owes its name. It was first called *platina*, or the *lesser* or *inferior silver*; and afterwards *platinum* by Linnæus, probably for the reason that the same alteration was made by Bergman: *viz*. that the Latin names of the metals might have the same termination and gender. In 1752, it was examined by Scheffer of Sweden, who found it to be a new metal, nearly approaching to the nature of gold; for which reason he called it *aurum album*, or white gold. It is not in the least degree affected by the action of water or air.

PLATING, the art of covering baser metals with a thin plate of silver. It is said to have been invented by a spur-maker, not for show, but a purpose of real utility. The more elegant spurs were used to be made of solid silver, and from the flexibility of that metal they were liable to be bent into inconvenient forms by the slightest accident. To remedy this defect, the workman alluded to, who resided at Birmingham, contrived to make a pair of spurs hollow, and to fill the space with a slender rod of steel or iron. Finding this a great improvement, and being desirous to add cheapness to utility, he contrived to make the hollow larger, and of course the iron thicker, till at length he discovered the means of coating an iron spur with silver, in such a manner as to make it equally elegant with those which were made wholly of that metal. The invention was quickly applied to other purposes; and numberless vessels have now the strength and cheapness of copper or iron, with the appearance of silver. The silver plate is generally made to adhere to the baser metal by means of solder. The solder is of two kinds, the *soft* and *hard*, or *tin* and *silver*. The former of these consists of tin alone;

the latter, usually, of three-fourths of silver with one of brass. The plate is first fitted to the article to be plated, by means of the hammer, and afterward fastened by melting the solder.

Plating, *Metal*, the joining copper and silver together, so that the copper appears on one side, and the silver on the other.

Plating, *French*, the burnishing leaf-silver on a piece of metal, prepared by heating to a certain degree. When silver is dissolved in aqua-fortis, and precipitated on another metal, the process is called silvering.

Play,
Play-House. } See Drama.

Plea, in law, that which either party alleges for himself in court, in a cause there depending. In a more confined sense, a plea is the defendant's answer to the plaintiff's declaration. Pleas are usually divided into *crown* and *common*. Pleas of the crown are suits in the king's name, or in the name of the attorney-general in behalf of the king, for offences committed against his crown and dignity, and against his peace; as treason, murder, felony, &c. Common-pleas are such suits as are carried on between common persons in civil cases; that is, in questions of property. See Common *pleas*.

Plinth, in architecture, a flat square member, in the form of a brick. It is used as the foundation of columns, and is that flat square table under the moulding of the base and pedestal, at the bottom of the whole order. See Architecture.

Plumbery, the art of casting and working plumbum, or lead. This metal melts speedily and with little heat, and is, therefore, easily cast into figures of any kind; but the chief business of plumbery is the making sheets and pipes of lead for various purposes in building. Sheets and other flat articles of lead are cast on a table spread with sand; and if figures or letters are to be raised on the surface, they are first impressed upon the sand. Leaden pipes are made hollow by being cast upon a core or round rod of brass or iron.

Plus, in algebra, the character +, used for the sign of addition: thus 127+7 amount to 134.

Plush, among manufactures, a kind of stuff, having a sort of velvet knap on one side, composed regularly of a woof of a single woollen thread and a double warp, the one wool, and the other goat's or camel's hair. There are also other kinds of plush, some composed wholly of hair, others of worsted, and others of silk.

Pluto, in mythology, the king or god of the infernal regions. He was the son of Saturn and Ops, and the brother of Jupiter and Neptune.

Plutus, in mythology, the god of riches. He was represented as lame and halting in his approach, but winged at his departure. He was also frequently said to be blind; from which defect, he sometimes bestowed his favours on the most unworthy, and left the most meritorious in necessity.

Pneumatics: the science of Pneumatics treats of the mechanical properties of elastic or aeriform fluids; such as their weight, density, compressibility, and elasticity. The air in which we live surrounds the earth, and extends to a considerable height above it. This, together with the clouds and vapours that float in it, is called the atmosphere. It is not visible, because it is perfectly transparent.

The existence of the air may be ascertained by swinging the hand edgeways swiftly up and down; which gives the idea of separating the parts of some resisting medium.

The air being a heavy body, presses like other fluids, in every direction, upon whatever is immersed in it, and in proportion to the depths. It is known that the pressure of the atmosphere is less upon a high mountain, than in the plain or valley beneath. The pressure of the air may be thus shewn: Cover a wine glass, completely filled with water, or wine, with a piece of writing paper: then place the palm of the hand over the paper, so as to hold it tight and accurately even. The glass may then be turned upside down, and the hand removed without the water running out. The pressure of the air upon the paper sustains the weight of water.

The air can be compressed into a much less space than it naturally occupies. Here is a glass tube open only at one end: it is of course full of air: plunge the open end into a bowl of water, and you see the water rises an inch or so in the tube, the air, therefore, which before filled the whole length of the tube, is compressed into a smaller space.

The air is of an elastic, or springy nature, and the force of its spring is equal to its weight. A bladder filled with air by blowing into it, is highly elastic: it proves also that air is as much a substance as wood or metal, for no force can, without breaking the bladder, bring the sides together, though the parts of an empty bladder may be squeezed into any shape.

When air is in motion, it constitutes *wind*, which is nothing more than a current of air, varying in its force, according to the velocity with which it flows. See WIND.

Air-pumps are machines for exhausting the air from certain vessels adapted to the purpose. Plate Pneumatics, fig. 1. represents one of the most convenient air-pumps. A A are two brass barrels, each containing a piston, with a valve opening upwards. The pistons are worked by means of the winch B, which moves them up and down alternately. On the wooden frame D E, there is a flat brass plate G, ground perfectly flat, and also a brass tube communicating with the two cylinders and the cock I, and opening into the centre of the brass plate at *a*. K the glass receiver to be exhausted of air, is made to fit very accurately on the brsss plate. Having shut the cock I, the pistons are worked up and down, and the air is suffered to escape, when the piston is forced down, because the valve opens upwards, but it is prevented from returning into the vessel for the same reason. The air is gradually exhausted from the receiver, which will become immoveably fixed. Upon opening the cock I, the air rushes violently and with a noise into the receiver.

Air is about 900 times lighter than water. A quart of air may be weighed in a Florence flask to which a little apparatus is added, and it is found to weigh 16 grains, but a quart of water weighs 14621 grains; the latter number being divided by the former gives 914, so that the air is 914 times lighter than water. The weight of the air is variable.

When the surface of a fluid, as water, quicksilver, &c. is exposed to the air, it is pressed by the atmosphere equally on every part, and is at rest. If the pressure be removed from any part, the fluid in that part must yield and be forced out of its situation. Into the receiver A, fig. 2, put a small vessel of quicksilver *x*, and through the collar of leather as at B, suspend a glass tube, closed at the upper end, over the quicksilver. The apparatus thus situated is to be placed on the brass plate of the air pump, and the air completely exhausted from the receiver, the tube is then to be let down into the quicksilver, which will not rise in it as long as the receiver continues empty: but as soon as the air is re-admitted all the surface of the quicksilver is pressed upon by the air, except that portion which lies above the orifice of the tube; it will therefore rise in the tube, until the weight of the elevated quicksilver presses as forcibly on that part of it which lies beneath the tube, as the weight of the air does on every other equal portion without the tube. Take a syringe or common water squirt, and having pushed the piston to the farthest end, immerse it in water, then draw up the piston and the water will follow: for when the piston is raised, the air is drawn out of the syringe, and the pressure of the atmosphere is removed from the part of the water immediately under it, consequently the water yields in that part to the pressure on the surface. Upon this principle *sucking-pumps*, as they are called, act: the piston accurately fitting the inside of the barrel, by being raised, removes the pressure of the atmosphere from that part, and consequently the water is forced up by the pressure upon the surface. See PUMP.

The pressure of the atmosphere is capable of supporting about 33 feet of water or about 29 or 30 inches of quicksilver. If a glass tube upward of thirty one inches long be filled with quicksilver and have its aperture immersed in a bason of the same fluid, the altitude of the mercury in it will be found to vary both at different times and in different places. Hence it appears that the weight of the atmosphere is variable, and the above mentioned tube filled with quicksilver has, from its shewing the actual weight of the atmosphere, been called a BAROMETER, which see.

The most usual altitude of the barometer in London, is between 28 and 31 inches, but it is seldom to be seen below 28½, or above 30½ inches. In calm weather when the air is inclined to rain, the mercury is commonly low. In serene settled weather the mercury is generally high. During very great winds, though unaccompanied with rain, the mercury sinks lowest of all with relation to the point of the compass from which the wind blows. See WEATHER, *rules for judging of*.

By removing the pressure from air it always expands, nor is it known to what degree this expansion will reach. By increasing the pressure upon air it may be condensed into any given space however small, nor has this condensation any known limits. The density of the air is in proportion to the force that compresses it. The bent tube A B C D, fig. 3, is open at both ends. Mercury is poured in so as to rise in both sides of the tube to C and B; the part from C D is full of air at the common density; stop up D so as to make it air tight, and pour mercury into A so that the column of mercury

A B shall be equal in length to the height at which it stands in the barometer at the time. The air in the shorter leg will now be compressed by the weight of the atmosphere, and also with an additional equal weight of a column of mercury. The mercury now in the shorter leg will be risen to E, and D E is only the half of D C: that is, the pressure of a double atmosphere compresses the air to half the space which it naturally occupies. If another column of mercury were added to the length A B, the air in D C would be reduced into one fourth the space that it formerly occupied.

As all the parts of the atmosphere press upon each other, the air near the surface of the earth is denser than that which is at some height above it. The height to which the atmosphere extends has never been exactly ascertained; but at a greater height than 45 miles it will not refract the rays of light from the sun. We shall conclude with an account of some experiments on the air-pump.

The resistance of air to falling bodies is shewn by exhausting a tall glass receiver of its air, and in that state the lightest body, as a feather, will fall to the bottom as soon as the heaviest metal, fig. 4.

If a cup of porous wood containing mercury be placed on the receiver of an air-pump, and the air from below be exhausted, the external pressure of the atmosphere will force the mercury through the wood in a sort of shower.

Let the air be taken from the pores of a piece of dry wood, which is then to be held under mercury while the external air is admitted into the receiver, the mercury will be forced into all the pores, as may be seen by splitting the wood.

If two brass hemispheres of three or four inches in diameter, made for the purpose, be put together, and the external air exhausted, the pressure from without will require 150 lbs. to separate them : but if the external air be taken away they will separate of themselves, fig. 5.

This is a square phial with a small valve at top. I will put it under the glass receiver K of the air-pump, and exhaust the air out of the receiver, and the air will escape from the phial at the same time. The air now being suddenly admitted into the receiver, will dash the phial to pieces, because the valve prevents it from getting into the phial again, fig. 6.

The elasticity or spring of air is shewn by tying up a very small quantity of it in a bladder, and putting it under the receiver K: the receiver is now to be exhausted of air, and the little confined in the bladder will by its elasticity completely fill the bladder.

This square phial is full of air, and the cork accurately cemented in, so that no air can escape. I will put it under the receiver K and exhaust the air from the receiver; the air within not being balanced by any without will burst the bottle in pieces.

Put a shrivelled apple under the receiver, and exhaust the air; then the air within the apple will make it as plump and handsome as when it was first gathered; but by the admission of the air it will return to its shrivelled state.

If a fresh egg with the small end cut off be put in a glass under the receiver, and the air taken away, the small bubble of air contained in the great end of the egg will expand, and force the contents of the egg from the shell.

Some beer made warm and put under the receiver will appear to boil when the air is nearly exhausted from the glass.

The smoke of a candle will ascend in the air, but in an exhausted receiver it will fall to the bottom, which shews that it generally ascends because it is lighter than air.

The sound of a small bell may be heard while it is under a receiver full of air; but as soon as the air is exhausted, there will be no more sound. Hence air is necessary to the propagation of sound. Animals will not live, nor candles burn, for a single instant, in an exhausted receiver.

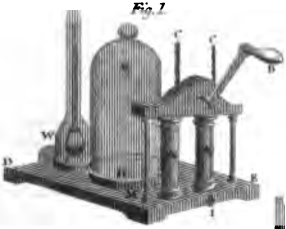
A, fig. 7, is a strong copper vessel, having a tube that screws into the neck of it, so as to be air-tight, and long enough as nearly to reach the bottom; *x* is the handle of a stop-cock. Having poured some water into the vessel, and screwed in the tube, the condensing syringe is to be adapted and the air condensed. The stop-cock is to be shut, while the syringe is unscrewed, then on opening the cock, the air by its great density acting upon the water in the vessel, will force it out into a jet of a considerable height. This is called the artificial fountain.

The sound of a bell is much louder in condensed than in common air.

A square phial that would bear the pressure of the common atmosphere, when the air is exhausted from the inside, will be broken by condensing the air around it.

Fig. 8, is the representation of the section of an

Fig. 1.



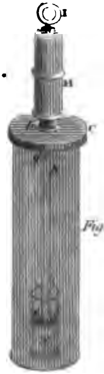
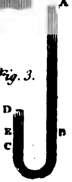
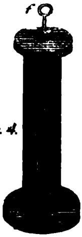


Fig. 2.

Fig. 3.





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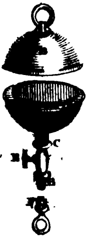

Fig. 5.

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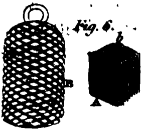

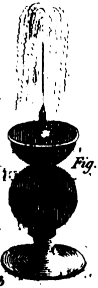

Fig. 7.

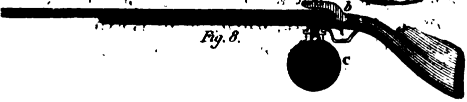

Fig. 8.

Cooper sculp.

Published by J. Harris, St. Pauls Ch. Yd. 1811.

air-gun. In appearance it is very much like a common musket with the addition of a round ball C. Into this ball is forced, by means of a syringe, a large quantity of condensed air, and then screwed to the barrel of the gun. When the leaden bullet is rammed down, the trigger is pulled back which forces down the hook *b* upon the pin connected with the valve, and liberates a portion of condensed air, which rushing through a hole in the lock into the barrel will impel the bullet to a great distance. The gun will contain many charges, and is capable of doing much mischief.

Poetry, that language which expresses the thoughts, feelings, and imaginations of a man enthusiastically enamoured of, or averse to, the subject on which he so expresses himself. Poetry, therefore, is the language of every man of ardent feelings. Those who have treated of this subject, have surely fallen into a mistake, when they suffered themselves to speak of "poetry" and of the "art of poetry" under one head. Never, otherwise, would they have spent a moment in calling "poetry the art of making verses, or lines or periods that are in rhyme or metre," or in discussing whether verse be or be not essential to poetry. Poetry, agreeably with the extensive signification of its Greek origin, assuredly includes every effusion, every creation of the mind, whether expressed by the pen, the pencil, or the reed. In all cases, poetry has the same general character: that of an appeal to the passions, and an attempt to win over the hearer to the conceptions of the poet, whether those conceptions be just or otherwise.

Point, in manufactories, a general term for all kinds of laces wrought by the needle.

Poison, any substance which, in a small quantity, proves destructive to the lives of animals, either taken by the mouth, mixed with the blood, or applied to the nerves. Of all poisons, those which may be called culinary are perhaps the most destructive, because they are generally the least suspected. Vessels of copper, and of bell-metal which contains copper, should be laid aside. Even those of the common earthen-ware, when they contain acids, as pickles, become very pernicious, because they are glazed with lead, which, when dissolved, is highly injurious, even in the smallest quantity; and tin, the least exceptionable of the metals, iron excepted, for culinary purposes, is never wholly free from arsenic. Mushrooms and the common laurel are also very fatal. The bitter almond contains a poison in its acrimony, and an antidote in its oil. The cordial dram *ratafia* is a slow poison; its flavour being procured from the acrid kernels of peach, black-cherry, &c. The spirit of the *lauro-cerasus* is peculiarly deadly. The adulteration of bread, beer, wine, porter, &c. produces the worst consequences, and merits the severest punishment.

Poisons, *methods of preventing the fatal effects of*: When a person has swallowed poison, the nature of the poison should be first ascertained, whether it be *vegetable*, as opium, fox-glove, &c. or *mineral*, as arsenic, corrosive sublimate, &c. When a poison has been recently taken, it may be evacuated by means of an emetic, or tickling the person's throat with a feather dipped in oil; but if the poison has been taken some hours, emetics will be injurious rather than beneficial. When mineral poisons have been recently swallowed, a scruple or two of ipecacuanha will sometimes suffice as an emetic; but if this should not operate, twelve grains of white vitriol should be given to adults. Where narcotic poisons have been swallowed, as opium, henbane, hemlock, &c. the person, must not, on any account, be allowed to sleep, but be obliged to drink plentifully of mucilaginous fluids, vinegar, strong coffee, &c. If arsenic, preparations of mercury, lead, &c. have been swallowed some time, and violent pain produced in the stomach, great anxiety, sickness, vomiting, griping, with a burning pain in the throat: in such cases a solution of soap in the proportion of one pound of soap to four pounds or pints of water should be drunk pretty plentifully.

Poison *tree of Java*, called in the Malayan language, *bohun-upas*, a famous tree, the very atmosphere of which is reported to be deadly, and from which, according to the same accounts, a gum of the most poisonous nature is obtained. M. Foersch has given a very circumstantial history of this tree, and related several striking instances of the effect of the poison, of which he asserts himself to have been an eye-witness; and Dr. Lambert Nolst, on the other hand, in a refutation no less circumstantial, has roundly asserted the whole to be false. See Dr. Darwin's Botanical Garden.

Pole, in astronomy, one of the extremities of the axis on which the sphere revolves. In geography, it is one of the points which are each distant ninety degrees from the equator: these are by way of eminence, called the poles of the world. The nations nearer the equator, have always considered the north as a region of darkness. The word *north*, and the equivalent terms in the Hebrew, Greek, Latin, and French languages, are all derived from gloom, obscurity, and darkness; yet, so great has been the mistake upon this subject, that the poles are now said to enjoy more light than any other part of the world.—In proportion as we advance toward the poles, the length of the twilight increases; and to this is to be added a very considerable share of light from the *aurora-borealis*, and a duration of moon-light unknown in the lower latitudes.

Pole or **Polar star**, a star of the second magnitude, the last in the tail of the ursa-minor. Its longitude, according to Flamstead, is 24° 14′ 41″; its latitude 66° 4′ 11″. The nearness of this star to the pole, whence it happens that it never sets, renders it of infinite service in navigation.

Policy *of insurance*, or *assurance* of ships, a contract whereby a person takes upon him the risks of a sea voyage; obliging himself to make good the losses and damages that may befal the vessel, from tempest, ship-wreck, pirates, fire, war, reprisal, or any other cause, either in part or the whole, in consideration of a certain sum *per cent.* more or less according to the supposed risk, and which sum is paid down to the assurer, by the assuree, upon his signing the policy. See Insurance.

Politeness, polished manners, or that conduct toward others which good will in the first place, and good sense in the second, imperiously dictates.

The objects of politeness are two: the first that of avoiding to give offence; the second, that of endeavouring to please. Politeness, in some degree, is inartificial; it results from simple goodness of heart: but, because all persons do and say a thousand unpolite things from a want of presence of mind, politeness must also be indebted to reflection. A system of politeness is a system of minor morals; and in these, as in the major, every thing may be briefly comprehended under two maxims, the one of negative, and the other of positive rectitude: forbear doing that to others which you would not have done to yourself; and do that to others which you would have done to yourself. To enter into a subject so very endless as the present is impossible; it may be useful, however, to make one remark, in direct opposition to which many who think themselves amongst the best bred usually act; never behave unpolitely to others because they do so to you. After all that has been said against Chesterfield, that reader is not to be envied who can go through his book and reap no real advantage. If it contains much that deserves no admiration, it only resembles in this respect almost every other book that exists.

Politics, the first part of economy or ethics, consisting in the theory of national government. Politics necessarily divide themselves into two branches; the one regarding a state in all its relations with other states, and the other its internal arrangements, or polity, and which includes what has lately been called its domestic economy.

Polity, or *Policy*, the peculiar form and constitution of the government of any state or nation;

or the laws, orders, and regulations relating thereto.

Polyadelphia, Polyandria, Polygamia. See Botany.

Polygamy, the being married, at the same time, to several wives or husbands. "Bigamy" is the being married to two.

Polyglott, a bible printed in several languages. The text in each language is ranged in opposite columns. The first polyglott bible was that of Cardinal Ximenes printed in 1517, which contains the Hebrew text, the Chaldee paraphrase on the Pentateuch, the Greek version of the LXX and the ancient Latin version. Walton's polyglott is that which is most highly esteemed: it is a republication of M. Le Jay's bible in Hebrew, Samaritan, Chaldee, Greek, Syriac, Latin, and Arabic. The edition by Walton is more correct, and perfect, with several new versions, and a large collection of various readings.

Polygon, a figure in geometry with many sides, or whose perimeter consists of more than four sides. Every polygon may be divided into as many triangles as the figure has sides, and may of course be easily measured. See Triangle.

Polygraphy, a word formerly used only for the art of writing in many manners; but recently employed for that of producing many copies of one picture.

Polype, a species of fresh water insect, of the order of zoöphytes, and class of vermes. The first account of these very curious animals was given by Lewenhoeck in the *Philosophical Transactions* for 1703. In 1741, Buffon wrote to Martin Folkes, acquainting him with the discovery of a small insect, called a polype, found about the common duck-weed, and of which, being cut in two, each piece put forth from the upper end a tail, and from the lower a head, so as to become two animals instead of one.

Numerous and more extraordinary facts than it is here possible to relate, respecting its multiplication by the division of its parts, and particularly the possibility of engrafting one polype upon another, belong to this animal; and on the whole, it ranks very low, if not the lowest, among animated things; yet surprize may perhaps be reasonably expressed, that, after all, any naturalist should think plants as justly entitled to be considered conscious of their existence, and in general, partakers of animal life, as the polype.

Certain species of the polype are usually found in ditches. "Whoever will carefully examine these when the sun is very powerful, will see many little transparent lumps, of the appearance of a jelly, and size of a pea, and flatted upon one side. The same kind of substances are likewise to be met with on the under sides of the leaves of plants which grow in such places.—These are the polypes in a quiescent and apparently inanimate state. They are generally fixed by one end to some solid substance, with a large opening, which is the mouth, at the other; having several arms fixed round it, projecting as rays from the centre.

1. The polypes have a remarkable inclination for the light; so that if that part of the glass on which they are, be turned from it, they will quickly remove to the other.

"That species named the *fusca* has the longest arms, and makes use of the most curious manœuvres to seize its prey. When this or any other kind is hungry, it spreads its arms in a kind of circle to a considerable extent; inclosing in these, as in a net, every insect which has the misfortune to come within the circumference. While the animal is contracted by seizing its prey, the arms are observed to swell like the muscles of the human body when in action. Though no appearance of eyes can be observed in the polype, they certainly have some knowledge of the approach of their prey, and show the greatest attention to it as it comes near them. It seizes a worm the moment it is touched by one of the arms; and in conveying it to the mouth, it frequently twists the arm into a spiral like a corkscrew, by which means the insect is brought to the mouth in a much shorter time than it otherwise would be."

POOR-*laws*; the reader is referred to an excellen article on this subject in the British Encyclopedia. Of the general outline of this most enormous and almost ineffectual burden on the people, much has been said in the excellent treatise of Mr. Colquhoun. The 43rd of Elizabeth, c. 2, is the foundation of all that is good in the poor laws; making provision for finding work for the industrious and able: for compelling the idle and able to labour, and for affording relief to the diseased and impotent: and the 13 and 14 Charles II. c. 12, is the foundation of all that is evil, by forming the system of settlements and removals: a system, establishing oppression, litigation and expence, and which has been more oppressive, and more productive of litigation and expence by every subsequent statute till the statute of 35 of his present majesty; which by forbidding removals in case the pauper is not absolutely chargeable, has remedied more than half the evils occasioned by the former laws. In the year ending with Easter 1803, the number of poor maintained in workhouses was 83,468, at the expence of 1,016,445*l.* 15*s.* 3*d.* being at the rate of 12*l.* 3*s.* 6 ¾*d.* for each person. The number relieved out of workhouses was 1,039,716, at the expence of 3,061,446*l.* 16*s.* 10 ½*d.*: of whom a large proportion was vagrants, and upon these were expended about 19,405*l.* 4*s.* so that each parishioner relieved out of workhouses cost the parish the sum of 3*l.* 3*s.* 7 ½*d.* The number of persons relieved in and out of poor houses being 1,039,716, at a time when the population was found by a census to be 8,872,980, makes the proportion of parishioners relieved from the poor's rate to be 12 in a hundred of the resident population. The total sum, raised by the poor's rate for the year 1802 was nearly 5½ millions: the average rate in the pound being 4*s.* 4 ¼*d.* in England, and 7*s.* 1 ½*d.* in Wales, and the average of England and Wales, is 4*s.* 5 ½*d.*

Pope, (from the Greek word *papa*, "father") a name originally given to Christian bishops, and, in the east, applied to all priests of that religion; but, in the Roman church, intended to denote, exclusively, its supreme head: who is now reduced to a mere cypher.

Population, the proportion of inhabitants which a country or district contains. The increase or diminution of the members of a state has at all periods been thought an object deserving the attention of governments. Notwithstanding this, there have been but few attempts to ascertain the circumstance with precision, till within a very late period: in the year 1757, a general enumeration was taken of the kingdom of Sweden, which has since been continued, but most of the other governments of Europe have been satisfied with returns of the number of houses, families, or persons paying particular taxes. In America the subject has been attended to with very great accuracy, and the result of two census taken in 1791 and 1801, are as follow:

	1791	1801
Total number of inhabitants	3,929,326	5,305,638

Here in ten years, was an increase of 1,376,312 or of more than one third of their number: which, unquestionably, is much greater than any other civilized nation can boast. Another peculiarity is the proportion of males to females. In Great Britain, and most other parts of Europe, the number of females living has been found to exceed that of males: in America the fact is otherwise, the number of the females being equal to that of the males, in most districts, and the average in the whole is in the proportion of 96 females to 100 males.

The population of Great Britain was long a subject of great uncertainty, both with respect to the actual number of inhabitants, and their increase or diminution, it became a subject of frequent controversy among writers on the internal policy and strength of the country, till it was at length set at rest by an Act of Parliament, passed 31st December 1800, which directed a general enumeration of houses, families, and persons, to be taken on the 10th March 1801, in England and Wales, and in Scotland as soon as possible after that day. This difference was necessary, because in the colder climate of Scotland, it was not certain that all parts of the country would be easily accessible so early in the year. An abstract of the answers and returns made, was laid before both houses of parliament in December following, which though unavoidably defective in some respects, furnishes much unexceptionable information on the subject.

Summary of Enumeration, 1801.

	Houses.			Persons.		
	Inhabited.	By how many families occupied	Uninhabited.	Males.	Females.	Total.
England	1,472,870	1,787,520	53,965	3,987,935	4,343,499	8,331,434
Wales	108,053	118,303	3,511	257,178	284,368	541,546
Scotland.........	294,553	364,079	9,537	734,581	864,487	1,599,068
Army including Militia	....	....	....	198,351	....	198,351
Navy including Marines	....	....	....	126,279	....	126,279
Seamen, in registered Ships	....	....	....	144,558	....	144,558
Convicts, on board the Hulks	....	....	....	1,410	....	1,410
Totals......	1,875,476	2,269,902	67,013	5,450,292	5,492,354	10,942,646

The islands of Guernsey, Jersey, Alderney, and Sark, the Scilly Islands, and the Isle of Man, were not comprised in the enumeration; the total population of these Islands has been usually estimated at about 80,000. The number of houses in Ireland has been nearly ascertained by the collection of a hearth-money tax, from whence it has been computed that the population of that part of the united kingdom somewhat exceeds four millions of persons. Therefore, with a very moderate allowance for those places from which no returns were received, and for omissions in others, the total population of the united kingdom of Great Britain and Ireland amounted to 15,100,000 persons.

The proportion of inhabitants to a house differs very considerably in some of the counties of England; the chief cause of this difference is the large towns, and particularly the sea-ports, which some of them contain, as in such places the inhabitants live more crowded together than in moderate sized inland towns. The difference in this respect between large towns and those of less extent will be shown with tolerable accuracy by the following statements.

Inhabitants.	Towns.	Persons to a House.
864,845	London	7¼
84,020	Manchester	6¼
77,653	Liverpool	6¾
63,645	Bristol	6
43,194	Plymouth	9¼
32,200	Bath	7½
32,166	Portsmouth	6
29,516	Hull	6¼
28,366	Newcastle	9

The other towns in England containing upwards of twenty thousand inhabitants, are the following;

Inhabitants.	Towns.	Persons to a House.
73,670	Birmingham	5
53,162	Leeds	4¾
36,832	Norwich	4½
31,314	Sheffield	4¼
28,861	Nottingham	5¾

The latter are all manufacturing towns, the trade of which had for several years previously to the enumeration, been in a very distressed situation, and had reduced the population much below its usual standard; a few years of peace will restore the inhabitants which these towns had lost, and reduce in some degree the population of the principal out-ports.

Proportion of persons to a house in towns of a moderate size.

Inhabitants.	Towns.	Persons to a House.
7,909	Devizes	5
7,668	Salisbury	5¼
7,655	Bury	5¼
7,579	Gloucester	5¼
7,531	Wellington	5¼
7,398	Lincoln	5
7,020	Northampton	5¼
6,828	Hereford	5
6,730	Newark	5
6,505	Tiverton	5¼
5,794	Taunton	5

The enumeration has not only ascertained with precision the proportion of inhabitants to the houses, but likewise the proportion of males and females. It has been long known that more male children come into the world than females, of which additional evidence is furnished by the registers of baptisms collected on this occasion, the total of the twenty-nine years for which returns were required being 3,285,188 males, and 3,150,922 females, or 104 males born to 100 females. This approaches much nearer to equality, than the proportion which previous accounts had appeared to establish, and will probably be found nearer the truth. It was thought by Dr. Price that six persons to a house for London, and five to a house for all England was too large an allowance, but the fact now appears to be than in England and Wales the proportion is 5¾ persons to a house, and in Scotland 5⅔.

The total number of males including the army, navy, &c. was 5,450,292; the total of females 5,492,354, exceeding the males by 42,062, which difference of less than one in 100, may be accounted for by emigration from this country to the East and West Indies, America, &c. very few females going from hence to reside in foreign parts in comparison with the number of males who are continually leaving the country in commercial pursuits, or from other motives. The result of the enumeration therefore, strongly proves that the number of males and females living, is as nearly equal as in a subject of this nature could be expected; and the circumstance of a greater proportion of males being born, appears a necessary provision for maintaining this equality, as providing against the greater adventitious mortality among males in consequence of the casualties to which they are exposed, and particularly from war and navigation.

Populus, the poplar, a genus in botany of which there are eleven species. 1. The abele; 2. the white-poplar; 3. the black poplar; 4. the aspen-tree, or trembling poplar; 5. the balsamifera or Carolina-poplar; 6. the tacamahaca of Canada, &c. The wood of the abele, in particular, is recommended for flooring. Of the black-poplar, the inner bark is used in Kamschatka for bread; and the cottony down of the seeds has been made into paper. The resin of the tacamahaca is employed in medicine. The Lombardy-poplar yields a dye of as fine a lustre, and equally durable, as that of the finest yellow wood, and its colour is more easily extracted.

Porcelain, a fine sort of earthen-ware, chiefly manufactured in China, and thence called china-ware. The combination of silex and argil is the basis of porcelain; and, with the addition of various proportions of other earths, and even of some metallic oxydes, forms the different varieties of pottery, from the finest porcelain to the coarsest earthen-ware.—Though siliceous earth is the ingredient which is present in largest proportion in these compounds, yet it is the argillaceous which more particularly gives them their character, as it communicates ductility to the mixture when soft, and renders it capable of being turned into any shape on the lathe, and of being baked.

Pores, small interstices between the particles of matter which compose bodies. Sir Isaac Newton shows, that bodies are much more rare and porous than is commonly believed. Water, for example, is nineteen times lighter and rarer than gold; and gold itself is so rare, as very readily, and without the least opposition, to transmit magnetic effluvia, and easily to admit even quicksilver into its pores, and to let water pass through it: for a concave sphere of gold hath, when filled with water, and soldered up, upon pressing it with a great force, suffered the water to ouze through it, and stand all over its outside, in multitudes of small drops like dew, without bursting or cracking the gold. Whence it may be concluded, that gold has more pores than solid parts, and consequently that water has above forty times more pores than solid parts. Hence it is, that the magnetic effluvia passes freely through all cold bodies that are not magnetic; and that the rays of light pass, in right lines, to the greatest distances through pellucid bodies.

Porphyry, in natural history, a kind of stone, of a uniform mass, spotted with separate concretions, and of great hardness. The porphyry of the ancients, and which is still found in immense strata in Egypt, was a most elegant mass of an extremely firm and compact structure, remarkably heavy, and of a fine strong purple, variegated more or less with pale red, and white. The hardness of porphyry is so extreme that it is not cut without the greatest difficulty and perseverance.

Port, a commodious place situated on the sea-coast, or at the mouth of a river, screened from the wind and the enterprizes of an enemy, with a depth of water sufficient for ships of burden. The city of Constantinople is called "The Port" from its having one of the finest ports in the world.

Portland *stone*, much used in buildings, is composed of a coarse grit cemented together by an earthy spar: it will not strike fire with steel, but makes a violent effervescence with nitric acid.

Portgreve, formerly the principal magistrate in ports and other maritime towns. According to Cambden the chief magistrate of London was anciently called port-greve, which was exchanged by Richard I. for two bailiffs, and these again gave place in the reign of John to a mayor, who was annually elected magistrate.

Position, in arithmetic, called also the rule of False, because in calculating on several false numbers as if they were true ones, from the differences found therein the number sought is found. These are single and double position, an example in the former will shew the object of the rule. Suppose A, B and C mean to buy a quantity of lead value 1400*l*., and it is agreed that B shall pay as much again as A, and C as much again as B, what must each pay. Take as a supposition that A pay 100*l*. then B will pay 200*l*. and C 400*l*: but this produces only 700*l*.: therefore we say as 700 : 1400 :: 100*l*. : 200*l*. = A's share of the payment; of course B's share is 400*l*. and C's share 800*l*. and 200+400+800 = 1400*l*.

Pot-ash, the lixivious ashes of certain vegetables, used on various occasions, as in the manufacture of glass and soap, and in fulling cloths. All vegetables, in proportion as they abound in saline qualities, are capable of yielding pot-ash; but the plant *kali* is the most excellent. The method of making pot-ash in the most perfect manner is this: a quantity of vegetable matter is burnt into grey ashes, and the ashes boiled in water, so as to make a very strong lixivium or lye; after which the lye, being previously strained, is evaporated over a quick fire almost to dryness; the matter remaining put into an iron crucible, melted, and then poured on an iron plate, where, when cool, it appears in the form of a solid lump of pot-ash. Britain imports pot-ash from the Black sea.

Potass, in chemistry, a name by which pot-ash in extreme purity is distinguished. See Voltaism.

Pottery, the manufacture of earthen vessels. This art bears some resemblance to two others, namely, those of modelling and turning. Like the former, it in part consists in fashioning bodies out of a ductile earth; and, like the latter, it is performed by means of a wheel and lathe, worked with the foot, while the hands apply the article to be formed, to the operation of the mechanic power.

The mouldings are formed by means of a piece of wood or iron, cut in the requisite form, held to the vessel, while the wheel is turning round. Feet and handles are made apart, and afterward conjoined. Embossed figures are made in wooden moulds, and afterward fixed.

POUNCE, gum-sandaric, reduced to a fine powder, used to rub on paper, to preserve it from sinking; or powdered *pounce*, or pummice-stone, or charcoal, used by embroiderers and other artists to transfer their patterns from paper on stuff or any other body. This is done by pricking the outline, in consequence of which, the pounce, passed over the whole, is left wherever the pin has pierced.

POWDER, *fulminating*: when three parts of nitre, two parts of potash, and one of sulphur are previously dried, and mixed together to trituration, they form a compound known by the name of fulminating powder. A few grains of this mixture exposed to heat in an iron ladle first melt, and when completely fused there will be a violent explosion. This combustion and explosion are owing to the instantaneous evolution of elastic fluids. The potash unites with the sulphur and forms a sulphuret, which with the assistance of the nitre is converted into sulphuretted hydrogen.

POWERS *moving*, the principal moving powers are: first, the strength of animals, chiefly that of men and horses; secondly, the force of running waters and of wind; thirdly, the force of steam; fourthly, the force of springs; fifthly, the weight of heavy bodies. The simple weight, as applied to clocks, jacks, and other machines, is the power which can be most easily applied as a first mover, and its action also is most uniform. As this power requires to be renewed after a certain period, it is mostly used for slow movements.

The spring is a useful moving power, but, like the weight, it requires to be wound up after a certain time, whence it is also chiefly used for slow movements. The spring differs from the weight in one remarkable respect, which is, that its action is never uniform, being strongest when most bent; but there are methods of rectifying this defect. Thus the spring of a watch is made to wind on a conical piece of metal, which assists the action of the spring when it is wanted.

The steam of boiling water is a most powerful agent, and recent improvements have extended the application of it from the smallest to the most powerful engines.

The force of running water, and that of wind, are very advantageous movers of many engines, such as pumps, mills, &c.

Running water is preferable to wind, as a mover of machines, on account of its uniformity.

PRACTICE, in arithmetic, or Rules of Practice, are certain compendious ways of working proportion or the rule of three: thus if I wish to know the value of 99¾ yards of cloth, at 1*s.* 2*d.* per yard, instead of stating the question by the rule of three, I multiply the sum by 9 and 11, and add to the product the value of the ½ yard, thus,

		1	2
			9
		10	6
			11
	5	15	6
½ of 1*s.* 2*d.* =			7
Ans.	5	16	1

Pragmatic *sanction*, in civil law, a rescript or answer of the sovereign, delivered with the advice of his council, to some college, order, or body of people, upon their consulting him on some case of their common interest; or, a letter from the sovereign, putting any question to such college, order, or body of people. A similar answer to a single person is called a *rescript*. The term *pragmatic* implies the solution of a difficulty.

Pragmatic *sanction*, in modern history, more particularly means the settlement of his hereditary dominions, made by Charles the VIth, emperor of Germany, on his eldest daughter Maria-Theresa; and which public act took place in the year 1722.

Prebend, the maintenance a prebendary receives out of the estate of a cathedral or collegiate church. Prebends are distinguished into simple and dignitary; a simple prebend has no more than the revenue for its support: but a prebend with dignity, has always a jurisdiction annexed to it.

Prebendary, golden, of Hereford, called also prebendarius episcopus, is one of the twenty-eight minor prebendaries, who has, ex officio, the first canon's place that falls. He was anciently confessor of the bishop and cathedral, and had the offerings at the altar; on which account he was called the golden prebendary.

Precession *of the equinoxes*, is a very slow motion of them, by which they change their place, going from East to West, or backward, in antecedentia, as astronomers call it, or contrary to the order of the signs.

From the late improvements in astronomy, it appears, that the pole, the solstices, the equinoxes, and all the other points of the ecliptic, have a retrograde motion, and are constantly moving from East to West, or from Aries towards Pisces, &c. by means of which, the equinoctial points are carried further and further back among the preceding signs or stars, at the rate of about 50″¼ each year; which retrograde motion is called the precession, recession, or retrocession of the equinoxes.

Precipitate, in chemistry, is any matter or substance, which having been dissolved in a fluid, falls to the bottom of the vessel on the addition of some other substance, capable of producing a decomposition of the compound. The term is generally applied when the separation takes place in a flocculent or pulverulent form in opposition to crystallization, which implies a like separation in an angular form. But chemists call a mass of crystals a precipitate, when they subside so suddenly, that their proper crystalline shape cannot be distinguished by the naked eye, as in the instance of Glauber's salt, when separated from its watery solution by mixing with it a portion of alcohol.

Preening, in natural history, the action of birds dressing their feathers to enable them to glide the more readily through the air. For this purpose they have two peculiar glands on their rump which secrete an unctuous matter into a bag that is perforated, out of which the bird occasionally draws it with its bill.

Premunire, in law, a certain writ, or the offence for which that writ is granted, under the statute of premunire. *Premunire* implies a timely securing and strengthening; and is applicable to the statute in question, inasmuch as it anticipates danger to the crown by rendering those punishable who assert the pope's supremacy, in any wise offend against the king, as head of the church, or refuse to acknowledge *his* ecclesiastical supremacy, by taking the oath in that case provided, or the oath of allegiance. The punishment authorized by this statute, which was made in the time of Richard the Second, for the purpose of checking the growing power of the pope, consists not only in all the disabilities attendant upon common outlawry, but also the attachment of lands, goods, and chattels, or imprisonment at the king's pleasure.

Prerogative-*court*, a court belonging to the archbishop of Canterbury, wherein wills are proved, and administrations granted that belong to the archbishop by his prerogative; that is, where the deceased had property to the amount of five pounds or upward, at the time of his death, out of the diocese wherein he died, and within the province of Canterbury. The archbishop of York has a similar court, called his *exchequer*.

Presbyterian, in ecclesiastical history, an advocate for the presbyterian form of church government. A presbyter is a senior or elder, and may be either a priest or a layman. The kirk or church of Scotland is governed by presbyteries, synods, and general assemblies: which constitution was introduced from Geneva, together with the doctrines of Calvin, the reformer of that country, by the well-known John Knox. In the kirk of Scotland there are fifteen synods, and sixty-nine presbyteries. The presbyterians stand opposed to the *episcopalians*, which latter prefer the hierarchy of bishops, and to *congregationalists* or *independents*, "who hold every *pastor* to be as a bishop or overseer of his own congregation, *independent* on any person or body of men."

Priest, in general, an officer who performs religious ceremonies. Priest, or presbyter, one who is invested with holy-orders, in virtue whereof he may administer the sacraments, and, in the Roman church, grant absolution.

Primate, in English church polity, the supreme dignitary: thus the archbishop of Canterbury is the "primate of all England," and his power extends over the province of York, as well as over his own.

Primates. See Mammalia.

Prime *numbers*, in arithmetic, are those which can be only measured by unity, or exactly divided by 1, without a remainder; such are 37, 11, 13, &c. they are sometimes denominated simple or uncomposite numbers.

Prince, a general title for all sovereigns, or persons exercising the functions of government in an independent manner, even though they are permitted so to do, by the will of another. A governor or viceroy is no prince, because he not only rules at the will, but in the name, and according to the directions of a superior. Certain sovereigns in Germany are called princes, because though they owe services to the emperor, they are yet independent within their own territories. The titles prince and princess, are also given, apparently in courtesy, to the children of sovereigns.

Prince *of Wales*, the title of a dignity appertaining to the eldest son of the king of England and heir-apparent of the crown. He is born duke of Cornwall, and is immediately entitled to all the revenues of that dutchy. He is subsequently created prince of Wales, by investiture with a cap, coronet, golden rod, and ring, and holds the dignity by patent. The title and principality were first given to the heir-apparent of England by Edward the first, who conquered the principality. While Normandy was annexed to England, the king's eldest son was called duke of that country.

Printers, *marks of*, see the next article.

Printing, the art of taking impressions from wooden-blocks, types, or plates, upon paper, silk, calico, or any other substance. Printing, in literary history, that very important art by means of which copies of books are multiplied, and consequently, knowledge and science diffused among mankind. It is understood to have been practised very anciently in China; but Chinese printing differs from European essentially, and the praise of rendering the art truly valuable to the human race belongs to him who first introduced moveable types.

Certain cities of Greece disputed with each other the honor of giving birth to Homer; and anxious for a still nobler glory, Mentz, Haërlaëm, Strasburg, and others, contend for having produced the first European printer. The question, in both cases, remains undecided. In their first essays, Guthemburgh, Fust, Mentel, and Koster, all used wooden blocks, on which the letters were cut, in the Chinese manner; and from the specimens that remain, it appears that they impressed only one side of the paper, taking the pains to paste the blank faces of every two leaves together, to make one with print on either side. After this, they used single letters of wood; and at length, letters of metal. This last great invention is generally attributed to Schœffer, first the servant, and afterward the partner and son-in law of Fust. The printing letters, or types, are described under the article Foundery.

The workmen by whom the art of printing is performed are of two kinds, 1. *Compositors*, who range and dispose the letters into words, lines, pages, and sheets; and 2. *Pressmen*, who apply the ink, and take off the impressions.

In printing the most careful compositor will make mistakes, which must be corrected before the sheet is worked off. The proof is therefore put into the hands of a reader, whose business is to read over the whole proof twice or three times with great care and attention, and mark such errata in the margin as he shall discover. The corrections are always placed against the line in which the faults are found. There are different characters used to denote different corrections: thus ⌣ is put to signify that a word is divided that ought to be in one, as pe rson instead of person; a mark resembling the Greek δ is put for *dele*, to intimate that something, as a point, letter, word, &c. dashed in that line, is to be taken out. If any thing is to be inserted, the place of insertion is marked with a caret, ‸, and the thing to be inserted written in the margin. Where a space is wanting between two words, or letters, that are intended to be separated, a parallel line must be drawn where the seperation ought to be, and a mark, somewhat resembling a sharp in music placed in the margin. An inverted letter or word, is noticed by making a dash under it, and a mark, nearly resembling the dele character reversed. When any thing is transposed it is thus denoted,

1 4 3 2
You merit your mistake, for "You mistake your merit," and in the margin write *trs* for transposition. Where a new paragraph is required, a line in the shape of a crotchet [is made, and the same mark placed in the margin. Where a paragraph ought not to have been made, a line is drawn from the broken off matter to the next paragraph, and in the margin write *no break*. If italic letters are to be changed for Roman, or vice versa, a line is drawn under them, and *Rom* or *Ital* is to be written in the margin. Where words have been struck out that are afterwards approved, dots are placed under such words, and in the margin is written the word *stet*. When letters of a different

fount or size are improperly introduced into the page; they are noticed by a small dash drawn through them, and the letter *wf* in the margin.

Prism, in geometry, an oblong solid, contained under more than four planes, whose bases are equal, parallel, and alike situated. If the body be triangular, it is called a triangular prism; if square, a quadrangular one.

Prism, in optics, or more precisely speaking, in dioptrics, a triangular glass body, used in experiments respecting the nature of light and colours. The phenomena and uses of the prism arise from its separating the rays of light in their passage through its substance; and the doctrine it is understood to demonstrate is, that colours are original and unchangeable properties, inherent in light itself. The sun's rays, transmitted through a prism to an opposite wall, project an image, like a rainbow. Its colours, which are various and vivid, are, red, yellow, blue, green, and violet: and the whole phenomenon is explained upon the principle that the coloured rays, which were before mixed and blended together, are now, in virtue of their different refrangibilities, separated by refraction, in passing through the prism, and each colour thrown by itself.

To examine the different colours of a ray of light, a small hole must be made in the shutter of a dark room, and the ray must fall upon a prism in an oblique direction.

Let A.B (fig. 24, Plate Miscellanies) represent part of the shutter of the window of a room, in which no light enters, excepting through the hole C. If the light of the sun be received upon a screen at any distance from the hole, as at *E*, a circular luminous spot will be formed upon the screen, which is larger in diameter than the hole at C. Place a glass prism D O E before the hole so that the light may pass through in the direction perpendicular to the axis of the prism; and instead of going straight from E to F, the light which comes through the hole will, by passing through the prism, be bent and dispersed in such a manner as to form a coloured spectrum or image G H upon a screen, which may be situated at any distance from the prism, but below the straight direction C F. The spectrum G H is about five times as long as its breadth, and is terminated by semi-circular ends. The highest part G is of a beautiful red colour, which, by insensible shades, degenerates into an orange, then a yellow, a green, a blue, an indigo, and a violet, which is the colour next to H. viz. at the lowest part of the spectrum.

If the whole spectrum be divided into 360 parts, the red will occupy 45 of them, the orange 27, the yellow 48, the green and the blue 60 each, the indigo 40, and the violet 80. By mixing the seven primitive colours in these proportions, a dusky white is obtained. Paint on a circular board the seven colours in their proper proportions, and then whirl the board with great velocity, it will appear of a dirtiesh white. If the colours were more perfect and accurately defined, the white would be more perfect also.

The seven colours are reducible to three, viz. the red, the blue, and the yellow. The most remarkable instance of the separation of the primary colours of light is that of the RAINBOW, which see.

Privateer, a ship of war, fitted out by private persons at their own expence, and who are permitted by their government to make prize of the vessels of an enemy. The owners of privateers must give bond not to break the stipulations of treaties subsisting with their government, and not to misuse their captives.

Privy-*council*, in British polity, an executive body, with whose assistance the crown issues proclamations which, if not contrary to law, are binding on the subject. Anciently, the privy-council was a high court of justice; but in modern times it seldom or never interferes with judicial matters, confining itself to the executive branch of government. A privy-council is summoned on a warning of forty-four hours, and never held without the presence of a secretary of state. In debates, the lowest delivers his opinion first; the king, if present, last; and though the privy-counsellors thus give their opinions, it is that of the king alone which is decisive. A privy-counseller swears, that truly and justly, to the utmost of his power, he will counsel the king; and farther, that he will keep secret the king's counsels. The number of privy-counsellors is about 150, of whom a part, consisting of the ministers, and those who really assist, constitute what is called the *cabinet-council*. The lord-president of the council is the fourth great officer of the crown. His office is to attend on the king, propose business at the council-table, and report the transactions there to the king.

Privy-seal, a seal affixed by the king, or by the lord keeper of the privy-seal, for the king, to instruments that afterward pass the great seal.

"*Lord privy-seal*," is the fifth great officer of the crown, through whose hands pass the charters, grants, pardons, patents, and other writings which have received the sign-manual, before they go to the great-seal. Some papers of less moment, likewise, as for payments of money, receive the privy-seal only. He is a lord by office, and a trustee of the British Museum; by usage, a member of the privy-council.

PROBABILITY of an event, in the Doctrine of Chances, is the ratio of the number of chances by which the event may happen, to the number by which it may both happen and fail. So that, if there be constituted a fraction, of which the numerator is the number of chances for the events happening, and the denominator the number for both—happening and failing, that fraction will properly express the value of the probability of the event's happening. Thus, if an event have 3 chances for happening, and 2 for failing, the sum of which being 5, the fraction $\frac{3}{5}$ will fitly represent the probability of its happening, and may be taken to be the measure of it. The same thing may be said of the probability of failing, which will likewise be measured by a fraction, whose numerator is the number of chances by which it may fail, and its denominator the whole number of chances both for its happening and failing; so the probability of the failing of the above event, which has 2 chances to fail, and 3 to happen, will be expressed or measured by the fraction $\frac{2}{5}$.

Hence if there be added together the fractions which express the probability for both happening and failing, their sum will always be equal to unity, of 1; since the sum of their numerators will be equal to their common denominator.

Proctor, in civil and ecclesiastical law, what an attorney is at common law.

Projectiles, are such bodies as being put into violent motion by any great force are then cast off or let go from the place where they received their quantity of motion; as a stone from a sling, an arrow from a bow, a bullet from a gun.

Prologue, in dramatic poetry, a discourse, usually in verse, addressed to the audience before the commencement of a play. In England, the prologue is usually made to consist of an apology or intercession for the poet, with some advertisement of the subject of his performance.

Pronoun, in grammar, a word supplying the place of a noun; as *he*, *she*, or *it*, for a *man*, *woman*, or *house*.

Protestant, in church history, a name first given in Germany to those who adhered to the doctrine of Luther: because in 1529, they protested against a decree of the Emperor Charles the Vth, and the diet of Spires, declaring that they appealed to a general council. The name has also been made to include the Calvinists, and is now become common to all Christians of the reformed churches.

Protractor, is the name of an instrument used for protracting or laying down on paper the angles of a field, or other figure. The protractor is a small semi-circle of brass, or other solid matter, the limb or circumference of which is nicely divided into one hundred and eighty degrees: it serves not only to draw angles on paper, or any plane, but also to examine the extent of those already laid down. For this last purpose, let the small point in the centre of the protractor be placed above the angular point, and let the side coincide with one of the sides that contain the angle proposed; then the number of degrees cut off by the other side computing on the protractor, will show the quantity of the angle that was to be measured. Protractors are now more usually made in the form of a parallelogram, and properly graduated at the upper edge.

Prussic *acid*, in chemistry, and the arts, one of the most important acids, formed chiefly during the decomposition of animal substances in high temperatures. It readily combines with pure alkalies, destroys their alkaline properties and forms salts called Prussiates. Prussic acid was discovered at Berlin, the capital of Prussia, hence its name.

Ptolemaic *system of the world*, invented by Claudius Ptolemy, supposes the earth immoveably fixed in the centre of the universe, round which the planets, sun and fixed stars, all move from east to west in 24 hours, in the following order, viz. the Moon next the earth: then Mercury: Venus: the Sun: Mars: Jupiter: Saturn: after these the fixed stars: the first and second crystaline heavens, and above all the primum mobile.

Ptinus, in natural history, a genus of insects of the order coleoptera, of which there are 40 species. The Ptinus pertinax is the death-watch of vulgar superstition: it is very destructive to wooden furniture and books. When touched it draws in its head and legs, and becomes immoveable.

Pudding *stone*, in chemistry, a term invented by English lapidaries to designate one particular mineral aggregate, consisting of oblong and rounded pebbles of flint, about the size of almonds, imbedded in a hard siliceous cement. The pebbles are usually black, and the cement a light yellowish brown. It is capable of receiving a very high polish, and is used in ornamental works. It is found chiefly in Essex. The French mineralogists have naturalized the term, poudingue, and have applied it to all rounded stones imbedded in a cement, so as to make it nearly synonymous to the English "rubble-stone."

Pulex, the flea, a genus of insects of the order aptera. The common flea undergoes the several changes experienced by the greater part of the insect race of other tribes, being produced from an egg in the form of a minute larva, which changes to a chrysalis, in order to give birth to a perfect animal.

Pulse, in animal economy, the beating or throbbing of the heart and arteries; or that reciprocal motion of those parts of the body, by means of which the warm blood is thrown out of the left ventricle of the first, into the second, and by these distributed through the whole system.

Pumice, in natural history, a volcanic production, supposed to be a fossil reduced to this state by the action of fire. It is found on the surface of the sea, and on its shores; and is particularly known to be produced by the burning mountains Etna, Vesuvius, and Hecla, among the eruptions of which it is thrown up, in great abundance. It is also seen in the Atlantic ocean, and is there considered as an evidence of the existence of fires of this description beneath the ocean.

Pump, *the common*, improperly called the sucking-pump, consists of a pipe open at both ends, in which is a moveable piston that fits the bore exactly. Thus fig. 25, Plate Miscellanies, is the representation of a common pump: A D is called the barrel which contains the piston; B D the suction-pipe. At the junction of these two parts there is a fixed valve D opening upwards. The mode of operation is as follows: the part B is fixed in water, and the piston C is to be close down upon the valve D. In drawing up the piston from D to C a vacuum is formed in that part, consequently the air in the rest of the pipe will force its way through the valve D, and fill the part which had been exhausted, but it will be rarer than before and not being equivalent to the pressure of the atmosphere upon the water in which the pump is immersed, the water will be forced up into the suction-pipe as far as x, until the air within be as dense as before. Upon depressing the piston a second time, the same effect is produced, till at length the water itself forces its way into the barrel. When the piston now descends, it is forced through D, it must therefore get above the piston by passing through its valve G, and when it is next raised, all the water above it will be lifted up, and will run off by the pipe E.

Pump, *the forcing*, consists of a barrel, a plunger, and two fixed valves, that should be air tight, and so disposed, as to let the water freely rise, but absolutely to hinder its return. In fig. 26 A B is the barrel, C a solid piston or forcer, at D is one valve opening upwards, the other is in the branching pipe S. When the *forcer* is first moved upwards in the barrel, the air below will be rarefied and the water rise up in B: by repeated strokes of the piston the water will be brought up between the fixed valves D and S. It cannot descend by D, but must make its way through the upper valve at S, which shuts the moment the water has passed. V is a strong air-vessel closed at the top by a small pipe T that reaches nearly to the bottom. The water is forced along the rising pipe S, gets into the vessel L, and rises above the lower part of the pipe T. The air which is above the water in the vessel being confined and condensed into a smaller than its natural space, presses by its elasticity upon the surface of the water, and forces it up the pipe T in a continued stream. This is the principle of the engine for extinguishing fires.

The water in a sucking-pump is raised from the well by the pressure of the atmosphere; and it can be raised only about 33 feet, because the weight of a column of the whole atmosphere is equal only to an equal column of water 33 feet high. The forcing pump is unlimited in regard to the height to which it can raise water. The air-vessel is added to the forcing pump, to give the water a more equable stream. A constant stream may be produced by *two* barrels, with pistons moving up and down alternately.

Puncheon, in mensuration, a measure for liquids containing an hogshead and one third; or eighty-four gallons.

Punctuation, in grammar, the art of giving to written language such pauses as determine its sense, by means of certain known marks or points, The common stops incident to a sentence are described under the article *Period*; but, beside these there are the points of interrogation (?) and of admiration or exclamation (!) which very usefully serve to warn the reader of the presence of these figures of rhetoric. Writers frequently evince a considerable degree of misunderstanding, or inattention, on the subject of these points. It is very common to see an exclamation marked with a note of interrogation; yet it were easy, it might be thought, for an author to know whether he means to ask a question, or merely to indulge his feelings.

Puritan, a name formerly given to the dissenters from the church of England, on account of their professing to follow the pure word of God, in opposition to all traditions and human constitutions.

Putty, in a popular sense, a kind of paste compounded of whitening and linseed oil, and, sometimes, with the assistance of white-lead. It is used by glaziers in fastening squares of glass into the sashes, or frames, of windows; and by house-painters, for filling up clefts and crevices in timber and wainscots. Putty, of another kind, is made by calcining equal parts of tin and lead, and is used in polishing metals and precious stones: it is the base of many enamels.

Pyrites. Iron, in combination with sulphur, forms a mineral substance, which has been long known under the name of Pyrites, and which is very extensively diffused. It occurs massive, disseminated, and frequently crystallized: the forms of its crystals are various, but the most common is the cube regular, or modified by truncation of the angles or edges, or accumination of three planes on the angles: the octaedron, dodecaedron, and icosaedron, also sometimes occur.

Pyrometer, a machine for measuring the expansion of solid substances, particularly metals, by heat. This instrument will render the smallest expansions sensible to the naked eye. A very simple one is represented in Plate Miscellanies, fig. 27. A A A, is a flat piece of mahogany to which are fixed three studs, B C D, and at B, there is an adjusting screw P. F is an index turning on a pivot x: L S is another turning on L, and pointing to the scale M N. R is a spring fastened to the board at Y, and pressing upon the index L S. The bar of iron, brass, &c. $o\ p$ is placed between the studs C, D, and by means of the screw P the index is so adjusted that it may point to O on the scale: if the bar be rubbed almost ever so little, it will expand, because friction produces heat, and heat causes an expansion of the parts of the metal. To calculate the degree of expansion it will be observed that the bar presses against F, and if by expansion F H is moved, L S will likewise be moved, and if the distance F x is only $\frac{1}{10}$th of X H and $r\ x$ be $\frac{1}{10}$ of r S, then if the bar be expanded the $\frac{1}{10}$th of an inch, the index at x will move an inch, and the other index at S will move 10 inches, of course if the bar expand only the $\frac{1}{1000}$th or the $\frac{1}{10000}$th part of an inch, the expansion, by the pyrometer, may be rendered extremely visible.

Pyrophorus, in chemistry, a compound substance, which takes fire on the admission of the atmospheric air: it is prepared by exposing to heat in an iron pot, three parts of alum, and one of flour: the mixture liquifies, and is to be stirred constantly till the whole becomes grey and is easily reducible to powder.

Pyrotechny, a term that refers to the composition, structure and use of artificial fire-works. The ingredients are saltpetre, sulphur and charcoal.

Q.

Q, the sixteenth letter in our alphabet, is not to be found either in the Greek, old Latin or Saxon alphabets. The Q is never sounded alone, but in conjunction with *u*, and never ends any English word. As a numeral Q stands for 500 and with a mark over it Q stands for 300,000. As an abbreviation *q* stands for quantity, or quantum, as *q. pl.* quantum placit, as much as you please, and *q.s.* quantum sufficit *i. e.* as much as is necessary.

Quadrant, in geometry, an arc or arch of a circle, containng ninety degrees, or the fourth part of the entire periphery or circumference.

Quadrant, a mathematical instrument of great use in astronomy and navigation, for ascertaining the altitudes of the sun and stars, and for taking angles in surveying. The following is a description of Hadley's Quadrant. (Fig. 28 Plate Miscel.) shows the quadrant, as usually constructed. The following parts compose the instrument. B C, the arc of 45° : A D, the index moving on a pivot, under the centre of the index-glass, E: which glass is in the exact direction of the index, and stands at right angles upon it. F, the fore-horizon-glass, which receives the reflection from the index-glass. G, the back-horizon-glass. The former stands parallel with the leg, A C; the latter at right angles thereto. K is a pivot, on which three dark glasses, or screens, move, so that any one, or more, may be placed between the index-glass and the horizon-glass, to diminish the lustre of the reflected planet. H and I, the vanes, or sights. The arc, B C, is called the limb, or quadrantal arc; what is beyond O, is the arc of excess; the residue of the arc usually is graduated up as far as 100°.

A large portion of the lower part of the index is open, so as to show the gradation on the arc: the lower edge is chamferred, that it may come close down to them, and is there divided into smaller portions: this scale is called the nonius, and shows the smaller divisions in a more correct and obvious manner than could be done by the quadrantal arc, on which each degree is subdivided into no more than three equal parts, of 20 each. Now the nonius, being divided into 21 equal parts, shows at what portions of the arc the index cuts the division of 20 minutes: therefore it shows every minute.

Quadruped, in zoölogy, a class of land-animals, covered with hair, and which have four limbs or legs, proceeding from the trunk of their bodies. Linnæus, in his system of zoölogy subdivides the quadruped, or four footed class, into six orders characterized by the number, figure, and disposition of their teeth: *Anthropomorpha*, so called as resembling man in their form; and which consist of apes, baboons, and monkeys, and have four fore-teeth in each jaw. 2. *Feræ*, or beasts of prey, with six sharp-pointed fore-teeth in each jaw, and very long canine-teeth. 3. *Agriæ*, have no teeth at all. 4. *Glires*, among which are the hare and the mouse kinds, are distinguished by having the fore-teeth only two in number, and those prominent. 5. *Pecora*, including the sheep, cow, and others, have no fore-teeth in the upper jaw, and those in the lower are six in number. 6. *Jumenta*, the teeth of which are five in number, and disposed in a manner totally different from those of the five preceding orders.

Another distribution of quadrupeds may be seen under the article Mammalia, or animals that suckle their young.

Pennant divides quadrupeds into

1. Hoofed,	3. Pinnated, and
2. Digitated,	4. Winged.

Quail, a bird of passage, from the massiveness of its form it may well be conceived that it becomes peculiarly weary from long flight. In the progress of quails from the northern regions up the Mediterranean, they uniformly, and on a day so exact as to be remarked in the almanacs of the island, stop at Malta. Here they descend, so exhausted by fatigue, and in such prodigious multitudes, that the inhabitants pick them up with facility, and in the greatest abundance. After resting one night, those that escape the hands of men, proceed to Syria, and Arabia, and spread over Asia and Africa.

Quaker, a name applied to the members of a religious community, the foundation of which was laid in England, during the protectorate, by George Fox, a native of Draiton in Leicestershire, and a shoemaker by trade.

The name *quaker* appears to be a perpetuation of a sort of *bon-mot* uttered by a justice of Derbyshire, when Fox, who was brought before himself and another, bade them "*tremble* at the word of the Lord."

The radical origin of the quakers is very naturally traced to that period of religious disquietude in which the church of England was established. The general idea of *reform*, was the rejection of outward ceremonies: but of the degree to which this rejection should be carried, it could not but happen that almost every man who thought for himself must have had a different opinion: hence it happened that among the advocates for *spiritual* religion, there were dissenters of every class; and, of these, Fox seems to have aimed at the highest refinement.

Whatever may have been or may be, the notions of individuals among the "society of friends" as they denominate themselves, the broad principles of their system are unquestionably the most admirable that can be adopted by mankind, and the only ones, it is not perhaps too much to say, that can constitute society, and regulate human life, on the principles laid down by the Teacher of Nazareth.

1. The fundamental doctrine of quakerism will be seen in the following positions insisted on in *Barclay's Apology*:

"1. God has given to all men, without exception, supernatural lights, which, being obeyed, can save them. 2. The scriptures were indeed given by inspiration, and are preferable to all the other writings of the world; but they are no more than secondary rules of faith and practice, in subordination to the light or spirit of God, which is the primary rule. 3. Immediate revelation has not ceased, a measure of the spirit being given to every one."

II. The second important principle is an extreme simplicity of outward dress and demeanour. Here, an acute observer will allow that it is impossible to affect the character of a people more decidedly than by regulations of this nature; and that where uniformity and simplicity of dress are not adopted, the morality of the gospel must in a great measure be impracticable, and commentators reduced to the miserable subterfuge of declaring that letters are not to be understood literally.—With respect to the use of *thou* for *you*, this is obviously an affectation, since the one has as much simplicity as the other.

III. The third great feature of quakerism consists in its internal regulation of a community of people by means of monthly and quarterly meetings: from these appeals lie to the yearly assemblies, which consist of three orders or classes: representatives, sent from the quarterly meetings, correspondents from the districts and foreign countries, and preachers.

Quarantine, in a particular sense, a term of 40 days, during which ships coming from places suspected of being possessed by contagious diseases, are appointed to remain, with a view of proving their purity, before they come into port.

QUARTER-*master*, in the army, an officer whose business it is to look after the quarters of soldiers, and of which there are several kinds. The quarter-master-general, who is to provide good quarters for the whole army; quarter-master of horse, quarter-master of foot, and quarter-master of each regiment.

QUARTER-*master*, in the navy, an officer who stows and trims the ship, overlooks the steward in his delivery of victuals to the cook, keeps watch, and performs other duty.

QUARTER-*sessions*. The sessions of the peace is a Court of Record holden before two or more justices, whereof one is of the quorum, for the execution of the authority given them by the commission of the peace, and certain statutes and acts of parliament. The justices keep their sessions in every quarter of the year at least, and for three days if need be; to wit, in the first week after the feast of St. Michael, in the first week after Epiphany, in the first week after Easter, and in the first week after St. Thomas, and oftener if need be.

QUARTZ, in mineralogy, a species of flint genus: it is harder than glass, and gives vivid sparks when struck against steel. It is brittle and easily frangible. Its specific gravity is 2.65. If two of the crystals are rubbed together they yield a phosphorescent light, and exhale a peculiar odour. It is composed of silica, alumine, and lime. It is found in abundance in the Alps, also in Hungary, Saxony, and in many parts of our own country.

QUATRE-NATIONS ("four nations") the name of a college founded by cardinal Mazarin, for the education and maintenance of 60 children, natives of Pignerol, Alsatia, Flanders, and Rousillon, four nations conquered by his king.

Queen, a woman who holds a crown: or, by courtesy, one who is married to a king. The former is sometimes distinguished by the title "queen-regent;" and the latter by that of "queen-consort." A queen-consort is a subject, though, as the wife of the king she enjoys certain prerogatives; as that she may not be sued before she be petitioned on the case.

The widow of a king is called a queen dowager. In Britain, no person may marry a queen-dowager without the consent of the reigning king or of parliament; and in the event of marrying even one below the rank of nobility, she retains her title.

Quercus, the oak tree, of which there are twenty-six species besides varieties. The Quercus robur, as is well known attains to a great size, and is distinguished from other trees by its sending off, horizontally, immense branches. The Quercus suber or cork-tree is found chiefly in Spain. The exterior bark is the cork, which is taken from the trees every eight or ten years without in the least injuring them.

Quick-*silver*. See Mercury.

Quinquina, the same with Peruvian or Jesuit's bark. See Cinchona.

Qui-tam, in law, is said of an action brought, or information exhibited, at the suit of the king, on a penal statute, wherein half the penalty is directed to fall to the suer or informer.

Quit-rent, in law, a small rent that is payable by the tenants of most manors, in consideration of which they go quit and free from all other services.

Quo-warranto, in law, the name of a writ which lies against a person or corporation that usurps or makes an improper use of any franchise or liberty, against the king, in order to oblige him to shew by what right and title he holds or claims such franchise.

R.

R. a consonant, being the seventeenth letter in our alphabet. In words derived from the Greek it usually has an *h* after it. Used as a numeral R formerly stood for 80, and with a dash over it stands for 80,000 but the Greek ρ signified a hundred. In physicians' prescriptions ℞ stands for *recipe*, *take*.

Rack, an infernal instrument of torture for the purpose of extorting confession from criminals. This instrument is now happily banished from the civilized world. The trial by rack was never known to the law of England.

Rajah, a feudal lord of the mogul empire. The rajahs either constitute or form part of the second and military cast of Hindûstan, which is sometimes called *cuttery* or kchatry. The golden age, or setye-yug of the hindû mythology, ceased when the existence of the rajahs or military chiefs began. A rajah differs from an *omrha* in that the first is an hereditary nobleman, and the second an officer of state or minister of government.

Rain, in meteorology, vapour precipitated upon the earth in the form of drops of water.

Rain *gauge*, a machine for measuring the quantity of rain that falls. There are various kinds of rain-gauges: that used at the apartments belonging to the Royal Society, at Somerset-House, is thus described: The vessel which receives the rain is a conical funnel, strengthened at the top by a brass ring twelve inches in diameter. The sides of the funnel, and inner lip of the brass ring, are inclined to the horizon in an angle of more than 65°, and the outer lip is an angle of more than 50°, which are such degrees of steepness, that there seems no probability either that any rain which falls within the funnel, or on the inner lip of the ring, shall dash out, or that which falls on the outer lip shall dash into the funnel.

A very simple rain-gauge, and one which will answer all practical purposes, consists of a copper funnel, the area of whose opening is exactly ten square inches: this funnel is fixed in a bottle, and the quantity of rain caught is ascertained by multiplying the weight in ounces, by .178, which gives the depth in inches, and parts of an inch. In fixing these gauges, care must be taken that the rain may have free access to them; hence the tops of buildings are usually the best places. When the quantities of rain collected in them at different places are compared the instruments ought to be fixed at the same heights above the ground at both places, because, at different heights, the quantities are always different, even at the same place.

The following is a table of the comparative quantities of rain that fell at different places in

England during the year 1800, expressed in inches and decimals or tenth parts of inches.

Months.	London.	Cambridge.	Chatsworth, Derbyshire.	Lancaster.	Kendal.	Exeter.	Plymouth Hospital.
Jan.	3,64	2,93	4,31	4,04	6,59	4,59	6,38
Feb.	0,24	0,25	0,52	0,54	1,77	1,17	2,19
Mar.	0,46	2,04	1,71	1,50	2,72	2,96	1,74
April	3,34	2,49	2,84	5,50	6,49	2,65	4,11
May	1,42	1,53	1,67	3,79	4,34	3,24	3,97
June	1,00	1,81	0,62	0,67	0,97	0,25	0,25
July	0,00	0,00	0,15	1,03	1,61	0,07	0,23
Aug.	3,52	2,38	0,95	0,94	0,89	0,73	1,28
Sept.	3,08	3,24	5,78	4,67	5,89	1,62	2,64
Oct.	1,52	1,62	3,64	5,00	8,24	1,28	2,14
Nov.	4,66	4,49	2,76	5,00	4,51	2,74	7,43
Dec.	2,10	2,78	2,03	6,25	4,13	3,32	3,09
	22,98	25,62	26,73	35,93	48,20	34,53	35,50

Rainbow, in meteorology, an arch exhibited in a rainy sky, and some similar situations, opposite to the sun, adorned with the prismatic colours, and formed by the refraction of the rays of light in spherical drops of water. An artificial rainbow may be obtained by contriving water to fall in little drops, the sun shining through which, it will appear to a spectator placed between the sun and the drops; especially if a dark body, as a black-cloth, be disposed beyond the latter.

Rampart, a massy bank of earth, three fathoms in height. Here the soldiers keep continual guard, and pieces of artillery are planted for the defence of the place. To shelter the guard from the enemy's shot, the outside is built higher than the inside; that is, a parapet is raised upon it, with a platform.

RANA, the frog, in natural history, a genus of amphibia, of the order Reptiles, of which there are thirty-six species. The Rana Bufo, or common toad, is found in shady and damp situations, and is often met with in cellars, concealed in recesses and holes. In spring it moves towards the water, and lays its ova in a brilliant band of glutinous substance, several feet in length. The ova appear like beads of jet, and in fourteen days these are develloped and swim about, nourishing themselves by insects and vegetable substances, till their tail disappears, and their legs are formed, and then they pass from water to land. The toad has been domesticated, and introduced to the parlour, where it catches its food, consisting of insects, with dexterity and alertness. It is a perfectly harmless creature, with respect to the human race. The eyes of the toad are remarkable for their clearness and beauty, and produce sensations of a very different nature from that disgust, and even horror, which its general appearance almost universally excites. Rana Temporania, or common frog, is met with almost all over Europe, in low and wet situations. During the heat of summer it generally resides in water, and is able to swim with great dexterity. It deposits its ova in March, and in about a month the young tadpoles are hatched. These possess little more than a head and tail, and exhibit a singular contrast to the form of the animal which they are destined to resemble. They are fond of basking in the sun, cannot well dispense with water any considerable time; and are incapable of sustaining rigorous cold.

Rana Esculenta or green frog, abounds in many countries in Europe: the animals of this species are extremely voracious, and will occasionally seize small birds, and chickens and ducks. They are in some countries much used as food, particularly in France.

Rape is a name given to a division of a county, and sometimes means the same as a hundred, and at other times signifies a division consisting of several hundreds, thus Sussex is divided into six Rapes, every one of which, besides its hundreds, has a castle, a river, and a forest belonging to it. The like parts in other counties are called tithings, lathes, or wapentakes.

Ravelin, in fortification, a detached work, composed only of two faces, which make a saliant angle, without any flanks, and raised before the counterscarp.

Ray, see **Optics**.

Recorder, a person whom the mayor and other magistrates of a city or corporation associate with them for their better direction in matters of justice, and proceedings in law. He also speaks in their name, upon public occasions.

Rector, a term applied to the possessors of several official situations; as 1. A clergyman who has the charge and cure of a parish, and the property of the tythes, &c. 2. The chief elective officer in several universities; 3. The head master of large public schools in Scotland; 4. The governor in several convents; 5. The superior of a seminary or college of the Jesuits.

Recusant, one who refuses to acknowledge the king's supremacy, adhering to the pope as supreme head of the church.

Redoubt, in fortification, a small square fort, without defence, except in the front.

Reduction of *metals*, in chemistry. All metals may be reduced from their metallic state either by the action of the air and heat or by that of the mineral acids separately, or by a mixture of the nitric and muriatic. The substances thus produced are denominated oxydes. When these oxydes are mixed with charcoal powder, or other combustible substances and heated in a crucible, they lose their earthy appearance and are changed into metals. By this operation the combustible is diminished and the oxyde according to the language of Stahl loses its phlogiston, but according to the French chemists the combustible absorbs the oxygen and the metal remains in a state of purity.

Regiment, a body of men, either horse, foot, or artillery, commanded by a colonel, lieutenant-colonel, and major. Each regiment of foot is divided into companies: but the number of their companies is unfixed. In Britain, however, a regiment of infantry is usually composed of ten companies, one of which is the grenadier, exclusive of two independant companies. A regiment of cavalry commonly contains six troops; but sometimes nine. A regiment of dragoons has eight troops in the time of war, and six in peace. Each regiment has a chaplain, a quarter-master, and a surgeon.

Register *ship*, in commerce, a vessel that receives permission from the king of Spain, or the council of the Indies, to traffic in the ports of the Spanish West Indies; and thus called because it is registered before they set sail from Cadiz.

Regrator, one who buys and sells again, in the same market or fair, any article of food not alive. Regrators are punishable by forfeiture of goods, and imprisonment, according to the first, second, or farther repeated offence.

Relievo, or *relief*, in sculpture, the prominence of a figure that rises from the ground or plane on which it is formed. There are three degrees of relievo: *alto*, *basso*, and *demi*. The alto-relievo, also called *haut-relief*, or high relief, is that in which the figure projects according to the natural proportions. Basso-relievo, *bas-relief*, or low-relief, is that usual on medals; and demi-relievo, *demi-relief*, or half-relief, is where one half of the figure rises from the plane.

Religion is different from *theology*, inasmuch as the latter is speculative, and the former practical. Religion is a system of duties: theology a system of opinions. Theology inquires into the nature of the power or powers to whom all visible things are in subjection; Religion is the sentiment which springs from that inquiry.

Remembrancer, a law officer, whose business it is to take care that the matters to be done by the authority to which he belongs, are not forgotten.

Repulsion, that property in bodies, by which, if they are placed just beyond the sphere of each other's attraction they mutually fly from each other. By repulsion a fine needle will lie on water without apparently touching it: and drops of water will roll over a cabbage leaf without leaving the least trace behind.

Reptiles, in zoölogy, the class of creeping animals, or such as rest on one part of the body quate to the burdens of the community, without the assistance of imposts, yet the least reflection convinces us that the security of political liberty consists in the reverse.

The ordinary revenue of the crown is now, as above suggested, extremely trifling: the *extraordinary*, which includes the whole amount of the taxes yearly voted by parliament, is that which is applied to the expences of government, and out of which the *civil* list, or more immediate revenue of the crown, is granted. Out of the civil list, are paid the salaries of the ministers, judges, &c; and only a comparatively small part really belongs to the person of the king.

Total net produce of the Taxes constituting the Ordinary Public Revenue of Great Britain, and of the additional taxes, imposed during the continuance of war for one year, ending the 5th of January 1808.

ORDINARY REVENUES.

	£.	s	d
Customs	7,462,380	4	10¼
Excise	17,896,145	14	2
Stamps	4,458,738	14	0¾
Land and Assessed Taxes	7,073,530	10	8¾
Post Office	1,277,558	11	4½
6*d.* in the pound, on pensions	71,353	0	5¼
1*s.* in the pound, on pensions	62,685	5	8
Hackney-coaches	26,445	0	5½
Hawkers and Pedlars, &c. &c.	10,325	9	5
Small branches, &c. &c.	91,422	14	7¾
	£ 38,430,575	7	10¼

War Taxes.

	£	s.	d.
Customs	2,730,792	14	6½
Excise	6,273,570	18	10
Property tax	9,864,189	4	10
Arrears of Income duty	23,072	19	0
Arrears under aid and contributions	2,888	11	2¼
	18,894,514	8	4¾
Ordinary Revenues	38,430,575	7	10¾
Total Revenue	57,325,089	16	3½

Reversions, or Reversionary Annuities, are those which do not commence till after a certain number of years, or till the decease of a person, or some other future event has happened.

Case I. To find the present value of an annuity for a term of years, which is not to commence till the expiration of a certain period.

Rule. "Subtract from the value of an annuity for the whole period, the value of an annuity to the time when the reversionary annuity is to commence." Thus, What is the present value, at 5 per cent. compound interest, of 80*l.* per annum for 24 years, commencing at the end of 8 years? 24 + 8 = 32. The present value of an annuity by the table, p. 160, vol. 3, for 32 years, is 15.802, and the value of one for 8 years is 6.463, therefore

$$\begin{array}{r} 15.802 \\ 6.463 \\ \hline \end{array}$$

£. s. d.

9.339 × 80 = 747.12 = 747.2 5 nearly.

Case II. To find the value of an annuity certain for a given term, after the extinction of any life or lives.

Rule. "Subtract the value of the life or lives, from the perpetuity, and reserve the remainder. Then say, as the perpetuity is to the present value of the annuity certain, so is the reserved remainder, to the number of years purchase required."

Example. What is the value of an annuity certain for 14 years, to commence at the death of a person aged 35, allowing 5 per cent?

The value of a life of 35 (Table, p. 233. vol. 3) = 12.502; this subtracted from 20, the perpetuity, leaves 7.498 = reserved remainder. Then as 20 : 9.898* : : 7.498 : 3.7107 = number of years purchase.

REVERBERATING *furnace.* See LABORATORY.

RHETORIC, the science of speaking, or of oratory. I. Eloquence is an attribute of oratory or speaking: we say "An eloquent orator or speaker."

II. Rhetoric requires of an orator the following qualifications:

1. Invention, or a genius adapted to the invention of novelties; a gift which must be obtained from nature, independent on art.

2. The talent of disposing every thing in its right place: a merit which results from precision of thinking. Disposition, in rhetoric, is what a masterly order of battle is to an army about to engage: it is not enough that we can find the arguments and reasonings that ought to enter into the subject on which we treat, but we must farther know how to dispose them in the order most proper to make an impression on the minds of the auditors.

3. Elocution, or the art of expressing himself with force, clearness, and precision.

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*The value of an annuity certain for 14 years. See the Table, p. 160, Vol. 3.

4. Memory, which is a faculty of the soul by means of which man preserves the idea of objects that have presented themselves to his perception, and recalls them when necessary.

5. Delivery, which is the art of managing with agreeableness and propriety the voice, countenance, and action of the body. Demosthenes considered delivery as the chief, if not the only qualification necessary to an orator. Plato says, that one who would be famous ought to possess the science of the philosopher, the subtlety of the logician, the diction of the poet, the voice and gesture of great actors.

III. Rhetoric divides an oration or speech into five parts: the exordium, narration, confirmation, refutation, and peroration.

The *exordium* is the part in which the speaker prepares the minds of the auditors for the things he is about to advance. It ought to be expressed with considerable care; the style should be rounded, noble, serious, and measured: and the matter and manner should be to the purpose, brief, and modest.

The *narration* is the recital of a fact or event, such as it happened or is supposed to have happened; and should have the qualities of clearness, probability, brevity, and consistency.

The *confirmation* establishes the proofs of a discourse, and arranges them in the manner best adapted to enforce conviction.

The *refutation*, or anticipation, supplies weapons to answer the assertions or arguments that may be opposed to the narration and confirmation; and here vigour and vivacity should be conspicuous.

The *peroration*, or epilogue, is a recapitulation of the principal things that have been treated of in the discourse; and should contain an appeal to the understanding or the passions of the auditors.

IV. There are three species of oratory, for each of which rhetoric provides appropriate rules. 1. In the *deliberative*, the object is to exhort those who deliberate to adhere to this or that opinion: 2. In the *demonstrative*, to shew what is worthy of praise, or of blame; 3. In the *judiciary*, to persuade, defend, or condemn.

V. Rhetoric recognizes in oratory three different styles of expression: the *simple*, the *temperate*, and the *sublime*.

Rhetoric, *figures of*. An accurate and philosophical writer gives the following definition of a *figure*, of which he considers a trope to be a species. A figure, he observes, is a manner of speaking, distinguished by a particular modification which reduces it to a certain class, and which renders it more lovely, more noble, and more agreeable, than a manner of speaking that expresses the same thought without this particular modification.

The principal figures of rhetoric are, 1. the Metaphor, 2. the Allegory, 3. the Metonymy, 4. the Synechdoche, 5. the Hyperbole, 6. the Catechresis, 7. Irony, 8. Ecphonesis, 9. Erotesis, 10. Climax, 11. Epanaphora, 12. Prolepsis, 13. Synchoresis, 14. Epanorthosis, 15. Anastrophe, 16. Apostrophe, 17. Asyndeton, 18. Polysyndeton, 19. Enantiosis, 20. Paralepsis, 21. Anacoensis, 22. Hypotyposis, 23. Vision, 24. Simile, 25. Prosopopeia.

1. A "metaphor" is an expression where a word

or phrase departs from its ordinary sense to another; or it is defined, a simile or comparison; thus it may be said that *Demosthenes* was the *bulwark of Athens;* because the patriotism of Demosthenes and a bulwark had this general resemblance, that they were of the last importance to the safety of the city.

2. An "allegory" is a fable, in which truth is introduced under cover; as that of Nathan, who wished to reprove David.

3. A "metonymy" is that figure in which one name is put for another, for which it may be allowed to stand, on account of some relation between the two; as when a humane prince is called a *Titus*, a cruel one a *Nero*, and a great conqueror an *Alexander*.

4. A "senechdoche" puts the whole for a part, a part for the whole, a genus for a species, or a species for a genus; the singular number for the plural or the plural for the singular; or something more, or something less, than the precise object meant; as *the waves* for *the sea.*

5. The "hyperbole" is a figure by which the speaker exceeds the strict bounds of truth, in order to convey a powerful idea to the imagination of his hearers; as *whiter than snow; the giants' lofty heads o'ertopp'd the clouds.*

6. The "catachresis," or abuse, borrows the name of one thing to express another; or one word is abusively put for another; this is used either when a thing has no proper name of its own, or, when, if it has, the borrowed name is more agreeable or more striking.

7. Irony expresses one extreme by its opposite; as when a fool is called a Solomon.

8. The "ecphonesis," or exclamation, is an expression of violent emotion; as *oh! ah! alas!*

9. The "erotesis," or interrogation, is a figure whereby the ardour of the mind is expressed, and the attention of the hearer roused. When inquiry is made about a thing that is doubtful, in order to be informed, as "what town is this? Where are you going?" there is no figure; but when that which might be uttered in the way of proposition, is, for the greater energy, made a question, that question is a figure: as,

"Will man be inspired with more pure and elevated sentiments by the idea of annihilation than by that of immortality? Will it produce more respect for his fellow-creatures, and for himself? more attachment to his country? stronger resistance to tyranny? greater contempt of death?"

If the interrogatory style of this period be done away, the sense will be equal, but the energy considerably less.

10. The "climax," or gradation, a figure in which several particulars are made to follow each other, each exceeding the former in importance, or approaching nearer to the ultimate object of the discourse.

11. "Epanaphora," or repetition, a figure which gracefully and emphatically repeats either the same words, or the same sense in different words: as,

"Thee, his lov'd wife, along the lonely shores,
Thee his lov'd wife, his mournful song deplores;
Thee when the rising morning gives the light,
Thee, when the world is overspread with night."

12. "Prolepsis," or anticipation, a figure by which the speaker suggests an objection to what he is advancing, and returns an answer; as,

"But grant that others can with equal glory,
Look down on pleasures and the baits of sense;
Where shall we find the man that bears affliction,
Great and majestic in his ills, like Cato?"

13. "Synchoresis," or concession, the granting or giving up whatever is not essential to the argument; to the end that this display of candour may prepossess the auditor with an opinion of the speaker's veracity, and at the same time present the real object more distinctly to his mind, by disencumbering it of all useless appendages: as,

"I allow that no one was more nearly related to the deceased than you; I grant that he was under some obligations to you; nay that you have always been in friendly correspondence with each other: but what is all this to the last will and testament?"

14. "Epanorthosis," or correction, the retraction or recalling, of something that has been said; for the sake of substituting that which is stronger or more suitable in its place: as,

"Is it possible that you have not heard, amid the conversation of this city, what laws—if they are to be called laws, and not rather the firebrands of Rome, and the plagues of the commonwealth,—this Clodius designed to fasten upon us?"

15. "Anastrophe," or inversion, the placing that last, and sometimes at a great distance from the beginning of a sentence, which, in the common order should have been placed first; as,

"Of man's first disobedience, and the fruit
Of that forbidden tree, whose mortal taste
Brought sin and death into the world, and all our wo,
With loss of Eden (till one greater man
Restore us and regain the blissful seat),
Sing, heavenly muse!"

The natural order of which words would be, *Heavenly muse! sing of man's first disobedience, &c.*

16. An "apostrophe," or occasional address, is a figure in which, to the interruption of the current of discourse, an appeal is made to some person, or personified object:

"Nature has given to man an instinctive sentiment of the existence of God, in inspiring him, as she does, with a contempt of earthly and fleeting advantages, and a desire of things heavenly and immortal. It is this sublime attraction that makes courage a virtue, and that induces us to rush on death amid so many cares for the preservation of life. Brave D'Assas! what did you hope for on earth, when, for the salvation of the army you poured forth your blood by night, unseen on the plains of Klosterkam? And you, still more glorious in the sight of God! obscure citizens, who fall without glory; ye, whose virtues draw down upon you shame, calumny, persecution, poverty, contempt, from those even who dispense honours among mankind, could you tread paths thus flinty and uneven did not a beam of divinity shine before your eyes?"

17. "Asyndeton," or omission, and 18. "Polysyndeton," or redundance, are figures by which the thought and language are animated or strength-

pned, by leaving out, or putting in, certain words. An instance of the latter is familiar: *I saw it with my own eyes.*

19. "Enantiosis," or antithesis, the placing things in opposition to each other:

"Though deep yet clear, though gentle yet not dull;
Strong without rage, without o'erflowing full."

20. "Paralepsis," or omission, a figure by which the orator pretends to conceal or pass by what he really means to enforce;

"I might say many things of his liberality, kindness to his domestics, his command in the army, and moderation during his office in the province; but the honour of the state presents itself to my view, and calling me to it, advises me to omit these lesser matters."

21. "Anacoensis," or communication, a figure by which the speaker addresses himself to his hearers or opponents, for their opinion upon the point in debate:

"Suppose, Piso, that any person had driven you from your house by violence, how would you have behaved?"

22. "Hypotyptosis," or lively description, a representation in such strong and glowing colours, as makes them seem painted or transacted to the hearer's imagination:

"The foe came on like a storm. The mingled sound of death arose. Man took man: shield met shield; steel mixed its beams with steel. Darts hiss through the air; spears ring on mails; swords on broken bucklers bound. As the noise of an aged grove beneath the roaring winds, when a thousand ghosts break the trees by night, such was the din of arms."

23. "Vision," a representation of things distant and imaginary, as if they were really present. This belongs to the most daring flights of passion.

24. "Simile," a figure by which one is compared to another:

25. "Prosopopeia." See PERSONIFICATION.

RHINOCEROS, in natural history, a genus of mammalia of the order Feræ. This quadruped is only exceeded in size by the elephant. Its nose is armed with a horny substance, projecting, in the full grown animal, nearly three feet, and is a weapon of defence which secures him from almost every attack. Even the tiger, with all his ferocity is but rarely daring enough to assail the rhinoceros. The skin of this animal is, in some parts so thick that it is scarcely penetrable by the sharpest sabre or even a musket-ball. The rhinoceros is not ferocious unless provoked: he runs with great swiftness and rushes through brakes and woods with an energy to which every thing yields. It delights in retired places near lakes and streams, and appears to derive one of his greatest satisfactions from rolling in the mud. See Plate Nat. Hist. fig. 38.

RHYME, in versification, the similitude of sound between the last syllable or syllables of one verse, and the last syllable or syllables of a verse succeeding immediately, or after a given interval. Rhyme is condemned by some writers, who would have modern poets adhere to the practice of the Greeks and Latins, in fixing the quantities of the syllables, and trusting wholly to those, and to the numbers or measure: but on the other hand it is contended that the arrangement required in modern languages, and which is wholly different from that of those just mentioned, will not allow to the former, equal beauty in that species of versification.

Rice, a plant, the seed of which is used as corn. It is cultivated in Italy and Greece; and perhaps over all Asia. As a food, it is of a restringent nature. The growth of this grain, says Mr. Grose, has a peculiarity not unworthy of notice, viz. that as it loves a watery soil, so, to whatever height the water rises, wherever it is planted, the growth of the rice keeps measure with it, even to that of twelve or fourteen feet; the summit always appearing above the surface of the water. In this necessary property, rice resembles many other aquatic plants. All rice, however, is not the produce of a watery soil. The upland rice will not grow in the low land: it is much better and more costly than the rice of the latter.

Ring, *of Saturn*, is to appearance a thin, broad, opaque circular arch, encompassing the body of that planet, like the wooden horizon of an artificial globe, without touching it, and appearing double when seen through a good telescope. See Saturn.

Riot, in law, the riotous assemblage of twelve persons or more, and non-dispersion upon proclamation being made.

Ritual, a book directing the order and manner in which divine service is to be performed.

River, in geography, a considerable collection of waters, formed by the confluence of two or more *brooks*, which deliver into its channel the united streams of several *rivulets*, that have collected the supplies of many *rills*, trickling down from numberless *springs*, and the *torrents* which carry off from the sloping grounds the surplus of every shower.

The Maragnon, sometimes called the river of the Amazons, is the largest river in the world. It crosses the broadest part of South America, making a course of not less than three thousand five hundred miles; and where it joins the Madeira, which is in the middle of that course, it is six miles in breadth. The other great rivers follow this in nearly the following graduation:

1. Senegal,
2. Nile,
3. St. Lawrence,
4. Höang-ho,
5. Rio-de-Plata
6. Yenisey,
7. Mississippi,
8. Volga.
9. Oby.
10. Amar,
11. Oroonoko,
12. Ganges,
13. Euphrates,
14. Danube,
15. Don,
16. Indus,
17. Dnieper.
18. Duina.

Roasting, in metallurgy, the separation of volatile bodies from those which are more fixed, by the combined action of air and fire; and is generally the first process in the separation of metals from their ores: it differs from sublimation only in this, that in this operation the volatile parts are dissipated, when resolved into vapours: whereas in that, they are preserved.

Rock, a stony mass, forming a portion of the substance of this globe: rocks are in general disposed in mountainous ranges, though in some few instances they are found existing in immensely large separate masses.

Rogation-week, the week preceding Whitsunday, thus called from the three *rogation-days* therein, *viz*. Monday, Tuesday, and Wednesday, on each of which extraordinary prayers and processions were made for the fruits of the earth. The word rogation is derived "a rogando Deum," "petitioning God."

Roll-office, an office in Chancery-Lane, London, appointed for the custody of the rolls and records in chancery.

Rolling-mill, a machine for working metals into plates, or bars which are required of an even thickness. Rolling-mills are chiefly used for drawing out iron bars after they have been manufactured into bar iron by the forge hammer. Iron hoops are also made with this machine. The iron is heated to a white heat before it is put into the mill.

Roman church or Roman Catholic, sometimes called the Latin and Western, in contradistinction with the Greek and Eastern, the title of a sect of christianity, and of a powerful hierarchy which, for a considerable period, governed Europe. The doctrines of this establishment have still considerable prevalence; but its temporal empire has dwindled into the most perfect insignificance. With respect, also, to the character of the Pope himself, the Roman Catholics are themselves much divided. Some allow his infallibility and supremacy in their full extent; others acknowledge them in part; and a third party wholly reject them. By the *infallibility* of the Pope, is understood his incapacity of error in church matters: a dogma which appears highly necessary to the support of absolute government, and which, considering that that church is wholly the Pope's creation, will not appear, to the philosopher, either so heinous, or so ridiculous, as it is commonly represented. By his *supremacy*, is meant his authority over the catholic church, however distributed through different nations. It is in this article that all the political mischief of the popedom consists. By assuming this supremacy, the Pope, in effect, assumes universal empire. Every one is aware that whoso governs the church, governs the state; and the British constitution, therefore, wisely acknowledges in the crown, the spiritual as well as temporal supreme. The Roman church enjoins belief in the seven sacraments, and the efficiency of works of supererogation; and directs the celibacy of the clergy, the reverence or worship of images and relics, and the celebration of divine service in the Latin tongue.

Rope, of *hemp*, *hair*, &c. These substances are spun into a thick yarn, and then several strings of this yarn are twisted together by means of a wheel. When made very small, it is called a cord, and when very thick, a cable. All the different kinds of this manufacture from whip cord to a cable fit for the largest man-of-war go by the name of cordage.

Rosary, in the Roman church, a chaplet consisting of five or fifteen decades of beads, to direct the recitation of so many *Ave-Marias*, in honor of the Mother of God. The rosary, serves not only to ascertain the number of recitals, but also to keep the thoughts alive to the act of devotion.

Rose, a beautiful flower produced by several species of briar. The antient poets record that the first rose was brought into the world by the hands of the god of love; and the occasion was, a desire to bribe Harpocrates, the god of silence, to an engagement that he would discover none of the secrets of Venus. Hence it became a custom to place *a rose* in rooms devoted to mirth and entertainment, as a symbol in the presence of which all restraint might be laid aside; and hence the poverb "*under the rose*" denotes secrecy, and inviolable silence. The rose is also, from the same cause, the direct emblem of silence.

ROSIN. See RESIN.

ROUND-HEADS, in British history, a name given during the civil war, to the members of the parliament-party, who usually wore short hair.

ROYAL ACADEMY *of London*, a corporation instituted by his present majesty, George III. for the advancement of drawing, painting, engraving, sculpture, modelling, and architecture.

ROYAL-INSTITUTION, a corporation erected by his present majesty, in the year 1800; the great object of which is to teach the application of science to the comforts and conveniences of mankind. The earl of Winchelsea was chosen its first president; Dr. Glasse its secretary; Dr. Garnet its professor in philosophy and chemistry. At present its reputation is kept up by Dr. Davy, a gentleman illustrious for many discoveries in chemistry. See VOLTAISM.

ROYAL-EXCHANGE, the burse or meeting-place of the merchants of London. It was first built in the year 1566, at the charge of Sir Thomas Gresham, and dignified with the epithet *royal* by solemn proclamation, made by order and in the presence of queen Elizabeth. This building was burnt in the great fire, one hundred years after its erection: and the present edifice raised by a joint subscription of the chamber of London, and the company of Mercers. Before the original erection of this exchange, the merchants used to meet in Lombard street.

Royal Society *of London*, an academy or body of learned men, instituted by Charles II. for the advancement of physico-mathematical science.

This society originated in an assembly of ingenious men, who before the restoration, weekly met at the lodgings of Dr. Wilkins, in Wadham-college, Oxford. In a private conversation, which took place on the 28th of November, 1660, between lord Brouncker, Mr. Boyle, Mr. Bruce, Sir Robert Murray, Sir Paul Neile, doctors Wren, Goddard and Petty, Mr. Balle, Mr. Wren, and Mr. Hill, the first idea of forming a regular college was suggested. As a preliminary measure, a set of regulations were drawn up, simple and plain, adapted to the character of the men, and the frugal manners of the age. The meetings were to be continued weekly, during term time, at 3 o'clock in the afternoon, in Mr. Rooke's chamber, at Gresham College, in London, were these gentlemen now were. In the vacations, the meetings were to be held at Mr. Balle's in the Temple. An admission-fine of ten shillings was levied on each of the members, who also engaged to contribute, at the rate of one shilling a week, whether present or absent, toward the expenses of the institution. Several new members were at the same time added;

and on the 5th of December following, the royal approbation and patronage was signified. The act of incorporation passed the great-seal on the 25th of July, 1662. The society was now erected into a corporation, consisting of a *president, council, and fellows*, for promoting the knowledge of natural things, and useful experiments. The manner of electing the fellows and officers is by ballot. The council consists of twenty-one persons, ten of whom are annually changed on St. Andrew's day. Each member on his admission, subscribes an engagement that he will endeavour to promote the interests of the society. The charges are, an admission-fine of forty shillings, and a quarterly contribution of thirteen shillings so long as the person continues a member. He is always at liberty to withdraw from the society, on signifying to the president his desire so to do.

The design of the institution is to make faithful records of all the works of nature or art, which come within its reach; so that the present as well as future ages may be enabled to put a mark on errors which have been strengthened by long prescription: to restore truths that have been neglected; to push those already known to more various uses; to make the way more passable to what remains unrevealed; &c. This society has commodious apartments in Somerset-place in the Strand. Its motto contains a maxim that is, indeed, the basis of all philosophical inquiry: "*Nullius in verba.*"

Rubric, denotes, in the canon-law, the title or head of a chapter; and, in books of liturgy, the directions given at the beginning of an office, with regard to its due performance: such heads or directions being antiently written or printed with red ink.

Ruby, a red-coloured, sparkling gem, of the first rank among precious stones. Rubies are found in Hungary and Bohemia: in the latter there is a mine of flints of various sizes, which upon breaking, are sometimes found to contain gems: but the most valued are brought from Pegu and Ceylon, the only parts of Asia in which they are known to have been discovered. When a ruby exceeds 20 carats, it may be called a carbuncle. The ruby is formed in a stony substance, or bed, of a rose colour, called *mother of ruby*, where it gains its colour by degrees. At first, it is whitish, and as it approaches to maturity becomes red. Hence, there are white rubies, half-white, and half-red; and there are also blue and red, which latter are called sapphire-rubies.

Runic, a term applied to the language and alphabet of the Goths, Danes, and other northern nations. The *runic* character appears to have been in use before the introduction of christianity in this part of the world, and has therefore a sort of appropriate connection with that early period of European history.

Rupee, a coin current in the Mogul empire, and other parts of India. The gold rupee is worth 2*s*. 6*d*. sterling. Of the silver rupees, the new and the old are of different value.

Russia, is bounded by the frozen ocean, on the North, by Asiatic Russia on the East, Tartary and Turkey on the South, and Sweden, Austria, and Prussia on the West. The Russian empire, the largest in extent in the world, comprehends all the northern parts of Europe and Asia, but only a small part even of its scanty population is in a state of civilization. In some parts of this country, the climate is so severe, that icicles are frequently seen hanging to the eye-lashes, and the drivers of carriages are often found frozen to death on their seats. The principal towns are Petersburg, the capital, on the Gulf of Finland; Moscow; Archangel, on the borders of the White Sea; Cherson, on the Black Sea; Astrachan, near the Caspian; and Tobolsk, the capital of Siberia. Petersburg, built since 1700, contains about 170,000 inhabitants.

The principal rivers are the Wolga, which after winding a course of three thousand miles, discharges itself into the Caspian Sea, by more than seventy mouths: the Don, or Tanais; the Nieper, and Niester. The inland navigation of Russia, is very extensive; goods may be conveyed by water from Petersburg to China, with an interruption of only sixty miles. Russia is celebrated for its timber and flax trade, its iron and copper mines in the Uralian mountains, and its fisheries.

Rural-*dean*. See **Dean**.

Russia-company, a trading corporation, instituted in the reign of Mary, and impowered to carry on commerce in all lands, ports, and places within the Russian dominions. This company is not at present very considerable; the trade being commonly pursued by private merchants, who may purchase the privilege for a small sum.

Rust, *of a metal*, See **Oxyde**.

S.

S, the eighteenth letter and fourteenth consonant of our alphabet: the sound of which is formed by driving the breath through a narrow passage between the palate and the tongue elevated near it, together with a motion of the lower jaw and teeth towards the upper. The sound of this letter varies, being strong in some words as in *this*, *thus*, &c. and soft in words which have a final *e*, as *muse*, *wise*, &c. It is generally doubled at the end of words, whereby they become hard and harsh, as in *kiss*, *loss*, &c. In some words it is silent, as in *isle*, *viscount*. As a numeral S anciently denoted 7: in music it signifies, solo: in navigation it stands for South: S.W. South-West, &c. See Q.

Sabæans, idolators of the East, who in all ages, whether converted in part to Judaism, Christianity, or Mohammedanism, or unacquainted with either, have worshipped the stars. Some of the Sabæans, who acknowledge the name of Christ, are distinguished by the title of "Christians of St. John," on account of their attachment to the baptism of that forerunner of the Messiah. Sabaism bears the marks of a primitive religion: to the adoration of the stars, it joins a strong inculcation of respect for agriculture.

Sabbatarians, Christians of the sect of Anabaptists who are only remarkable for adhering to the Judaic sabbath, the observance of which they contend was not done away by the Christian dispensation. They appear to have been first distinguished in the sixteenth century. Their number is at present very small.

Sabella, a genus of the vermes testacea, of which there are twenty five species: Sabella scruposa is found in India and the American islands. The shell is subulate, and composed of equal grains of sand. Sabella alveolata, has numerous parallel tubes, forming in the mass the appearance of honey-combs.

Sabellians, a sect of Christians founded by Sabellius, in the city of Ptolemais, in the third century. The general doctrine of Sabellianism, describes the Trinity as making only *one* person; that is, that the Father, the Son, and the Spirit, are names of the one God under different circumstances.

Sacbut, or double trumpet, a musical instrument of the wind kind. It bears no resemblance to the common trumpet, in form or size. It is usually fifteen feet long, when extended to its full length. The wreath is two feet nine inches in circumference.

Saccharum, a genus in botany, the sugar cane, of which there are eleven species. The most important of these is the Saccharum officinarum, common sugar cane. See **Sugar**.

Saclactic acid. To this acid Fourcroy has given the name of mucous acid, because it is obtained from gum arabic and other mucilaginous substances. This acid may be obtained by the following process. To one part of gum-arabic, or other mucilaginous substance, add two parts of nitric acid in a retort, and apply a gentle heat. There is at first disengaged a little nitrous gas and carformed with so much expedition that, in three or four hours, a single man makes as much bread as an hundred can eat in a day.

Sail, in ship-building, a strong hempen cloth or canvas, fastened to the yards and stays of a ship, to form a body against which the wind may act, and thereby drive the vessel on her course. Ten sails are the usual complement of large ships; but the number is occasionally increased by the addition of bonnets at bottom, and case-sails at the sides. Sails, also denote the vanes of windmills; or the arms or flights upon which the wind acts.

Sal *ammoniac*, natural, in mineralogy, a species of the fossil salts, is of a greyish white colour, passing to yellow. It is flaky, and of a saline consistence. It occurs massive, and likewise crystallized: the crystals are small and adhere or intersect one another; externally shining, internally splendent or shining, and lustre-vitreous. The substance is composed of

Muriate of ammonia - - -	97.50
Sulphate of ammonia - - -	2.50
	100.00

When placed on burning coals it emits a peculiar odour, and is volatized in the form of white smoke: when burned or rubbed with lime, it emits an ammoniacal smell. Hence lime or fixed alkali bruised together and put in a phial make a good smelling bottle.

Sale, *by inch of candle*, a mode of sale by auction, adopted by merchants in London, and particularly the company of those trading to the East-

Indies; who, when it is desired to dispose of a cargo of goods speedily, disperse catalogues describing the lots of goods, the price at which they will be set up, and the advance to be observed in bidding; and at the time of sale, set up an inch of candle, during the burning of which, the persons present are free to bid. When the candle goes out, the last bidder is entitled to the lot; but this, to prevent, or in case of, dispute, is again set up; and the last bidder is now finally left in possession.

Salic law, an ancient constitution of France, of which the main import is expressed in the following words: *De terra salica, nulla portio hæreditatis mulieri veniat; sed ad virilem sexum tota terræ hæreditas perveniat:* "No part or portion of salic land can be inherited by women; but let the whole descend to the male sex." By this law, the crown of France was prevented from being worn by a woman; but the provision was a general one, without particular regard to the royal family; as the crown of England descends to the eldest son, by the *general* right of primogeniture.

Salix, a genus in botany, the willow, of which there are fifty three species. The Salix caprea, or common sallow tree, grows abundantly in this country: it is found in dry situations and is utterly unfit for the basket-maker, but is well adapted to poles, stakes, and to lop for fire-wood. The Salix Babylonica, or weeping willow, a native of the East, will not flourish unless situated near the water.

All the species of Salix are of the tree kind, very hardy, remarkably fast growers, and several of them attaining a considerable stature when permitted to run up to standards. They are usually of the aquatic tribe, being generally the most abundant, and of most prosperous growth, in watery situations; they, however, will grow freely almost any where, in any common soil and exposure; but considerably the fastest and strongest in low moist land, particularly in marshy situations, by the verges of rivers, brooks, and other waters; likewise along the sides of ditches, &c. which places often lying waste, may be employed to good advantage in plantations of willows for different purposes.

SALMON, a genus of fishes of which there are sixty species: the salmon galar, or the common salmon abounds principally in the Northern Seas, which it quits at particular periods, to ascend rivers to a very considerable height, and deposit its spawn in them. In order to gain the favourite spots in rivers for this purpose, which are sometimes at the distance of several hundred miles from the ocean, these fishes will overcome difficulties of surprizing extent, stemming the most rushing currents, and leaping with astonishing activity over various elevations. It is related, that the same individual fishes will return to the same spot for a succession of seasons; in this respect exhibiting preferences similar to those of birds in similar circumstances. The salmon is generally about two feet and three-quarters long, and has been seen of the length of six, and weighing, in this case, seventy four pounds.

SALT, in chemistry, was once described as a simple substance, but it is now known to be a compound body. Neutral salt, a compound formed by the combination of acids with alkalies, earths, or metallic oxyds. The salts naturally divide themselves into two classes. 1. The alkaline and earthy salts. 2. The metalline salts. The former, distinguished by their acids, may be divided into thirty-two genera, every acid constituting a genus: but the enumeration and description of these are the province of the chemist. Among them are reckoned vitriol, alum, saltpetre, common salt, alkaline salt, acid salt, sal-ammoniac, borax, &c. By far the greater number of saline bodies are of little use, either in chemistry or in arts. But some, as alum, copperas, &c. constitute the basis of different arts and manufactures; and others are the sources from which chemists obtain many of the most valuable of their instruments of analysis, as salts, nitre, sal-ammoniac, &c. Volatile salts become distinguishable to the nose, tongue, and brain, by their tenuity and briskness; fixed salts, by their bitterness and heat in the mouth.

Salt, in the popular sense, a saline crystallization, used to season or preserve meats. This is usually called common salt. Salt is either procured by evaporating sea-water, or the water of salt springs, as in England and France; or dug in mines, as at Cracow in Poland, Sarax in Hungary, and Catalonia in Spain. White-salt and bay-salt are of the former kind; and fossil, rock, or gem-salt of the latter.

Dr. Watson, in the second volume of his "Essays," speaking of the salt mines, says, "There are several mines of rock-salt near Northwich in Cheshire, the first of which was discovered as they were boring for coal in the year 1670:

The springs which are met with both above and below the level of the Northwich bed of rock-salt, are strongly impregnated with salt. This is easily accounted for: the rain water, in sinking through the ground which lies over the rock-salt, at last arrives at the salt; its further descent is in a great measure obstructed by the solid body of salt; it rests upon it, and, in resting upon it, dissolves it, and thus constitutes a brine-spring above the level of the bed of rock-salt. The brine-springs, which are found below that level, probably arise from the water, which has dissolved a portion of rock-salt, in sinking to that depth in the earth. "I have," continues the Doctor, "had the curiosity to go to the bottom of some of the most famous mines in England, but I never thought my labour, in these subterraneous expeditions so well rewarded as in the sight of the rock-salt mines at Northwich. These are superior to the mines at Cracow, in Poland, which have, for many centuries, been the subject of general admiration." A single pit, at Northwich, yields, at a medium, 4,000 tons of salt in a year.

A curious phenomenon, consisting in a crystallization of salt upon trees, hedges, and the fields in general, was observed in the county of Kent in the month of April 1799, and in the inland counties of Warwick and Oxford in the same month 1793.

In the latter instance, the wind for some time had been brisk, proceeding from the points between North and East, with considerable haziness and moisture in the atmosphere, which, without rain changed to dryness and clearness. The gentleman from whose account these particulars are taken, examining the buds of the trees, in different degrees of forwardness, was surprized at what he took for an hoar-frost in the middle of a fine day; but on closer inspection, he convinced himself that the crystals which covered the sides of the trunks, branches, gates, &c. facing the wind, were common-salt. The writer subjoins a quære, whether it be possible that the violent and continued action of the wind in the same direction upon the ocean, could raise the spray or particles of water in such a manner as to convey them a hundred miles from the coast?

Salt-*petre*. See Nitre.

Salute, in military discipline, a testimony or act of respect performed in different ways, according to circumstances. In the army, the officers salute by dropping the point of the sword. At sea and in fortifications, salutes are made by discharges of cannon. The number of guns fired is greater or less, in proportion to the degree of respect to be displayed.

Ships always salute with an odd number of guns; and galleys with an even one. The vessel under the wind of the other fires first.

Ships that have no guns, salute by a general shout; which is also sometimes practised after a discharge of guns. When there are several ships of war together, the commander alone salutes.

Samaritans, an ancient sect of judaism, or, rather, a rival nation of Jews. At present their number is small. They are chiefly found at Gaza, Neapolis, Damascus, and Cairo. Joseph Scaliger wrote to the Samaritans of Egypt for an account of their religion; and by their answers, it should seem that they adhere more strictly to the law of Moses than do the other descendants of Israel.

Samiels, the Arabian name for a hot suffocating wind peculiar to the desert of Arabia. It blows over the deserts in the month of July and August: it approaches the very gates of Bagdat, but is said never to affect a person within its walls. It frequently passes with the velocity of lightning, and there is no way of avoiding its dire effects, but by falling on the ground, and keeping the face close to the Earth. Those who are negligent of this precaution experience instant death.

Sanction, an authoritative approval or determination.

Sanction, *pragmatic*. See Pragmatic.

Sand, in natural history, a genus of fossils, the characters of which are, that they are found in minute concretions; forming together a kind of powder, the genuine particles of which are all of a tendency to one determinate shape, and appear regular, though more or less complete concretions; not to be dissolved or disunited by water, or formed into a coherent mass by means of it, but retaining their figure in it; transparent, vitrifiable by extreme heat, and not dissoluble in, nor effervescing with acids. See Sand-stone.

Sand is of great use in the glass manufacture; the white writing sand being employed for making of the white glass, and a coarse greenish-looking sand for the green glass. In agriculture it seems to be the office of sands to make unctuous earths fertile, and fit to support vegetables, &c. For earth alone, we find, is liable to coalesce, and gather into a hard coherent mass, as appears in clay;

and being thus embodied, and as it were glued together, is no way disposed to nourish vegetables.

SAND-*flood*, a terrible mischief, incident to the lands of Suffolk, and some other parts of England; which are frequently covered with vast quantities of sand, rolling in upon them like a deluge of water, from sandy hills in their neighbourhood.

SANHEDRIN, or SANHEDRIM, a word said to be derived from the Greek, and signifying the great public council, civil and religious, of the antient jewish republic or hierarchy.

SAPPHIRE, a precious stone of a fine blue colour. The sapphire, which is found in the same mines with the ruby, is nearly allied to that gem. The sapphires of Pegu are held in the highest estimation. They are found in various other places; as Calicut, Cananor, and Ceylon, in Asia; and Bohemia and Silesia, in Europe.

SAPONARIA, a genus in botany, the *soap-wort*, of which there are nine species. The Saponaria officinalis, is a British plant, and has a creeping root, so that in a short space it would fill a very large space of ground. A decoction of this plant is used to cleanse and scour woollen cloths: the poorer people in some countries use it instead of soap for washing.

SATELLITE. See SOLAR *system*.

The eclipses of the satellites, especially of those of Jupiter, are of very great use in astronomy. First, in determining pretty exactly the distance of Jupiter from the Earth. A second advantage still more considerable, which is drawn from these eclipses, is the proof which they give of the progressive motion of light. It is demonstrated by these eclipses, that light does not come to us in an instant, although its motion is extremely rapid. For if the motion of light were infinite, or came to us in an instant, it is evident that we should see the commencement of an eclipse of a satellite at the same moment, at whatever distance we might be from it; but, on the contrary, if light move progressively, then it is as evident, that the further we are from a planet, the later we shall be in seeing the moment of its eclipse, because the light will take up a longer time in arriving at us; and so it is found in fact to happen, the eclipses of these satellites appearing always later and later than the true computed times, as the Earth removes further and further from the planet. When Jupiter and the Earth are at their nearest distance being in conjunction both on the same side of the Sun, then the eclipses are seen to happen the soonest; and when the Sun is directly between Jupiter and the Earth, they are at their greatest distance asunder, the distance being more than before by the whole diameter of the Earth's annual orbit, or by double the Earth's distance from the Sun, then the eclipses are seen to happen the latest of any, and later than before by about a quarter of an hour. Hence therefore it follows, that light takes up a quarter of an hour in travelling across the orbit of the Earth, or nearly eight minutes in passing from the Sun to the Earth; which gives us about 12 millions of miles per minute, or 200,000 miles per second, for the velocity of light. A discovery that was first made by M. Roemer.

The third and greatest advantage derived from the eclipses of the satellites, is the knowledge of the longitudes of places on the Earth. Suppose two observers of an eclipse, the one, for example, at London, the other at the Canaries; it is certain that the eclipse will appear at the same moment to both observers; but as they are situated under different meridians, they count different hours, being perhaps 9 o'clock to the one, when it is only 8 to the other; by which observations of the true time of the eclipse, on communication, they find the difference of their longitudes to be one hour in time, which answers to 15 degrees of longitude.

Satin, in commerce, a kind of silken stuff, of a smooth and glossy surface. The warp is very fine, and stands out; the woof coarser, and hidden underneath. On these particulars depend its gloss and beauty. Satins are wove at Florence, Genoa, Lyons, and Bruges, and in China. Those of Bruges have their warp of silk, and their woof of thread.

Saturation, in chemistry. As there are certain limits to the proportions in which bodies combine together, beyond which they cannot pass, these are called the points of saturation; and when two bodies in uniting together, have reached this point, they are said to be saturated, or the one body is said to be saturated with the other; in other words the change has taken place, and a new compound is formed. When, for instance, a salt is dissolved in water, as common salt, the water combines only with a certain proportion; and whatever quantity of salt is added beyond this proportion, it falls to the bottom undissolved.

Satrape, in English history, certain lords in the reign of King Etheldred; who, by the order of their subscription to some charters of that time, appear to have ranked next below dukes. It has been supposed that they were the king's ministers.

Saturday, in chronology. The Scandinavians, and from them the Saxons, had a deity named Crodo or *Seater*, from whom the English name of the *dies Saturnii* of the Romans may be derived; but the subject is obscure.

Saturn, in astronomy, a very conspicuous plant, though not so brilliant as Jupiter, Venus, or even Mars: He shines with a pale dead light. His diameter is nearly 80,000 miles in length, his distance from the sun is 903 millions of miles, and he performs his journey round that luminary in little less than 30 of our years. Of course he travels at the rate of nearly 21,000 miles an hour. He is supposed to have a rotation about his axis in little more than 12 hours. He is encompassed with two broad rings, which are probably of considerable importance in reflecting the light of the sun to the planet. He has also attending upon him seven moons.

Saturnalia, in antiquity, feasts in honour of Saturn. The golden age subsisted previously to the usurpation of Jupiter; of consequence, in the reign of Saturn. The Saturnalia were celebrated with such circumstances as were thought characteristic of the golden age; particularly, the overthrow of distinction and rank. Slaves were reputed masters during the three days of this festivity; were at liberty to say what they pleased; and, in fine, were served at table by their owners. The Saturnalia were held annually, about the middle of December. The custom was brought from Greece.

Saturnine, or **Saturnian**, a term applied to persons of dark, sullen, melancholic complexions. This the astrologers attribute to the ascendancy of Saturn at the hour of their birth; but we must go higher, and remember that the planet was called Saturn because of its distance from the sun; and the seeming melancholy of its solitary situation; and that Saturn, the god, was melancholy because of the fatal prediction of deposition by his son, and his consequent vow to destroy his children.

Savoy, a country of Europe bounded on the North by the lake of Geneva, on the East by Switzerland, the Milanese and Piedmont, on the South by Piedmont and France, and on the West by France. It is remarkable for prodigious mountains which make part of the Alps: the most famous is Mount Cenis, the road from Savoy to Piedmont being cut over it. The higher mountains are perpetually covered with snow and ice. The chief river in this country is the Rhone. The inhabitants are generally poor; many of them seek subsistence in France, England, and other richer countries than their own, in the quality of shewmen and other mean employments, but return home to spend their small savings and to end their days.

Satyr, in mythology, a kind of semi-god or dœmon which inhabited the woods, under the controul of Pan.

Sawing, dividing timber, &c. by the application of a saw, either by the hand or mill. The mechanism of a sawing-mill may be reduced to three principal things; the first, that the saw be drawn up and down as long as is necessary, by a motion communicated by water to the wheel: the second, that the piece of timber to be cut into boards be advanced by a uniform motion to receive the strokes of the saw; for here the wood is to meet the saw, and not the saw to follow the wood, therefore the motion of the wood and that of the saw ought immediately to depend the one on the other: the third, that when the saw has cut through the whole length of the piece, the machine stops of itself, and remains immoveable; for fear, lest having no obstacle to surmount, the force of the water, or steam, should turn the wheel with too great rapidity, and break some part of the machine.

Saxony, a considerable country in Germany, including the dutchy of that name and several electoral circles, as part of Meissen, Vogtland, Thuringia, Lusatia, and Henneburg. The dutchy of Saxony contains 27 towns and 400 villages. The chief rivers are the Elbe, Elster, Mulda, and Saal. Saxony was the nursery of the Reformation, introduced by Luther. The arts and sciences flourish in Saxony, and the manufactures are numerous of thread, linen, porcelain, glass, cutlery, carpets, velvet and muslins.

Scarabæus, in natural history, the beetle, a genus of insects of the order coleoptera, of which there are several hundred species. In this country, the Scarabæus melolontha, or cock-chaffer, is very common. The larva inhabits ploughed lands, and feeding on the roots of corn; and the complete insect makes its appearance during the middle the decline of summer. This insect sometimes appears in such prodigious numbers, as almost to strip the trees of their foliage, and to produce mischiefs nearly approaching to those of the locust-tribe.

A species of great beauty is the Scarabæus auratus, or golden beetle, about the size of the common or black garden beetle; the colour is most brilliant, varnished, and of a golden-green. This is a fine object for the magnifying glass. It is not very uncommon during the hottest parts of summer, frequenting various plants and flowers; its larva is commonly found in the hollows of old trees, or among the loose dry soil at their roots, and sometimes in the earth of ant-hills. The Scarabæus stercorarius, or clock beetle, flies about in an evening, in a circular direction, with a loud buzzing noise, and is said to foretel a fine day. It was consecrated by the Egyptians to the Sun.

Scalds, or *burns*, treatment of, See Burn. The modern method of treating injuries of this kind is as follows: Take a tea-cup, and put into it some alkohol, camphorated spirit, or spirit of turpentine, place it in a bason of hot water, so as to heat it to what the finger will bear; then with a rag dipped into it wash and bathe the whole injured surface. When bathed three or four times, apply the following liniment to the whole extent of the injury, spread on old linen: Take of yellow basilicon ointment one ounce: spirit of turpentine three drachms, or as much spirit as is sufficient to make the ointment the thickness of honey. The yellow ointment stops the pores of cloth, impedes evaporation, and thus confines the effect of the spirit to the burned surface. The first dressings are to remain on 24 hours, and on the following day, fresh liniment is to be applied. Care must be taken that the air is secluded as much as possible during the time the wound is dressing.

Scarlet, in dying, one of the seven hues of red. There are two kinds of scarlets, the one produced by scarlet-grain or kermes, a kind of gall; and the other by the cochineal insect.

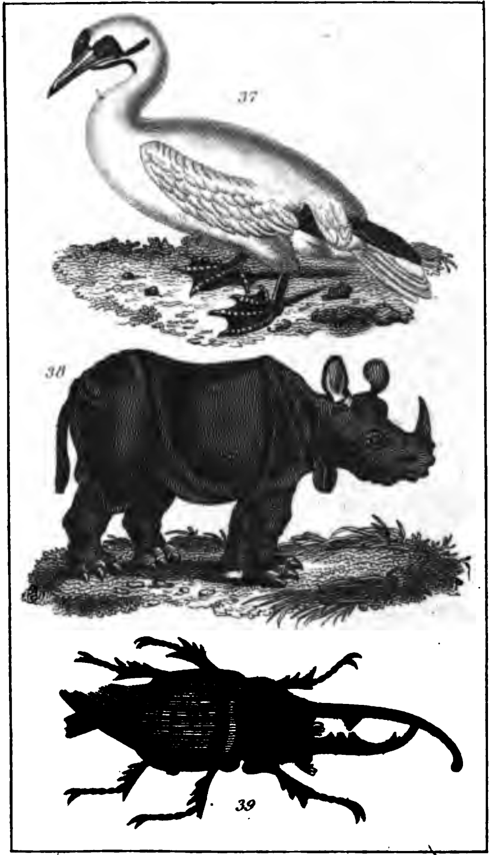
Scene, in the drama, has four senses: in its primitive one, it denotes a theatre, the word meaning a tent or booth; in its second, it means a decoration of a theatre, as the picture at present dropped between the acts. The ancients had three scenes of this kind, which served for the three kinds of pieces; a scene of a palace for tragedies; one of houses and streets for comedies; and one of a forest for pastorals. In its third sense, a scene is the place in which the action is performed, as in a room or in a garden; and in its fourth, it means that portion of a drama which belongs to the same person or persons, in one place.

Scenography, in perspective, stands opposed to ichnography and orthography. *Ichnography* is the ground-plan; *orthography* the elevation, or a flat view of a front of an object; and *scenography* or perspective view, taking several sides, and representing every thing in its apparent proportions.

Sceptre, a *baton* or little staff worn by kings. Critics are not agreed whether it represents a javelin or a staff; that is, whether it be a badge of military or of civil authority. The Greek poets decorate the most ancient kings with sceptres.

Scepticism, also called Pyrrhonism (from its founder, Pyrrho, who lived under Alexander the Great), that philosophy which teaches a general suspension of judgment.

Vol.IV. *Natural History.* p.190.Pl.14.



Cooper Sculp.

Fig. 37. **Pelecanus** *Bassanus: Gannet.*
Fig. 38. **Rhinoceros** *unicornis: one-horned Rhinocerous.*
Fig. 39. **Scarabœus** *Hercules: Beetle.*

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SCHISM, a division: the word is usually applied to religious separations.

SCHOLIAST, one who writes *scholia*, or notes, glosses, &c. upon ancient authors.

SCHOOL, in belles-lettres, a public place of instruction. "Of such a school" is a phrase that means "of a manner peculiar to a certain time, place, master, or model."

SCIAGRAPHY, a profile or section, showing the inside of a building.

SCIENCE, demonstrated knowledge. The difference between science and art is, that the first is speculative, and the second mechanical. Science plans, and art performs. The difference between science and philosophy is, that the first consists of facts, and the second of opinions. Science gives data; philosophy draws conclusions.

SCIURUS, in natural history, the squirrel, a genus of the Mammalia class and of the order Glires. These animals live principally on seeds and fruits. They are extremely active in climbing trees, and bounding from one to another with a spring truly astonishing. Some are supplied with membranes, which enable them to extend this leap into something like a short flight. Some are subterraneous, and others build in trees. They are sprightly, elegant and interesting.

SCOMBER, the mackarel, in natural history, is one of the most beautiful fishes, and inhabits both European and American seas. It is said to reside near the north pole in winter, and as the spring advances to move in immense shoals in a southerly direction, traversing a vast space in a very short period, and proceeding nearly in a similar line of movement to that attributed to the herring.

Scorpio, a genus of insects of the order aptera. There are ten species, all of which are armed with a slightly pungent sting; and in hot climates some of them are highly dangerous: they prey upon worms, spiders, flies, &c. and even upon one another. Scorpio afer, or great African scorpion, is the largest and by far the most formidable of the whole genus: it is held in great dread by the inhabitants. Scorpions are viviparous, producing a very considerable number of young at once.

Scorpio, in astronomy, the eighth sign of the zodiac, in which according to Mr. Flamsteed there are 49 stars.

Scratch, in the language of the salt-workers of our country, the name of a calcareous, earthy, or stony substance, which separates from sea-water in boiling it for salt. This forms a thick crust, in a few days, on the sides and bottoms of the pans, which they are forced to be at the pains of taking off once in a week, or ten days, otherwise the pans burn away and are destroyed.

Scribe, *of the law*, in Jewish polity, one who issued authentic copies of the scriptures, and decided questions on the same.

Sculpture, in general, the art of fashioning figures of things. In this sense, it includes cutting or carving on stone or wood; modelling in clay; engraving; &c. Sculpture, in a confined sense, the art of forming figures of things in stone. In sculpture, the first operation is that of making a model of earth or wax. Earthen models are made with few instruments besides the hands. The wax for models is mixed with half its quantity of colophony. A block of *stone* or *marble* is next to be sawed to the extreme dimensions required, and then fashioned, by taking off what is superfluous with a stubbed point and heavy mallet. When the proportions are nearly obtained, the work is proceeded in with a finer point. A flat cutting instrument, with three teeth, is next employed; and afterward a chissel, to take off the scratches of the former. The softness and delicacy of the work is produced by means of the chissel; and, by degrees, it is brought into readiness for polishing. This concluding operation is first performed with pumice and smalt, and afterwards with tripoli. When uncommon lustre is required, use is made of burnt straw.

Sea, in geography, is sometimes used for the ocean, or that vast tract of water encompassing the whole globe; but, more properly, for a particular part or division of the ocean; as the Red-sea, the White-sea, the Irish-sea. According to the opinion at present entertained, the surface of the ocean is to the surface of the land as three to one. With respect to the depth of the ocean, no certain knowledge has ever been obtained. The greatest depth to which it has been actually sounded is one mile and 66 feet. The surface of the earth below the sea is evidently similar to that above it; here rising into mountains, the tops of which we call islands and continents, and there sinking into vallies. The quantity of water that composes it has been computed at 3,205,893,975 cubic miles; and that which it receives daily, from all the rivers, 36 cubic miles. The grand process of evaporation continually diminishes it; while the vapours supply the springs, and these the rivers, by which it is as continually reimbursed. The sea encroaches upon the land in some places, and loses ground itself in others. The proportions remain nearly the same. The bottom of the ocean, where opportunity of examining it has occurred, is found to resemble the dry land in materials as well as in features. If the dry land is dug to any considerable depth, rock is uniformly met with; and the same is found in the bed of the ocean. The strata, too, are similar, and disposed in the same manner. The earth, therefore, whether dry or covered with water, forms but one whole. Springs of fresh water, some of which are so voluminous as to displace, for a considerable distance, the current of the salt, issue from the bed of the ocean; and even volcanoes vomit forth their perpetual fire. Sea water is in itself as colourless and transparent as river-water: the various appearances which it assumes are owing to accidental causes. It varies according to its depth, the materials that compose its bed, or the presence or absence of the sun. When the sun shines upon it, it is green; when it gleams upon it through a fog, yellow. Near the north-pole it appears black; and between the tropics often brown. The salt of the ocean is undoubtedly communicated to it by the earth it washes, and the matters incessantly carried into it; but it is strange that theorists should have thought that the quantity of the salt increases, and hoped to find the age of the world by calculating the time in which its present saltness has been acquired. Such men can have no idea of the eternal renovation of which the works of nature are always capable.

The ocean has three kinds of movements; 1. The undulation of its surface, occasioned by the wind; 2. A continual tendency toward the West, beginning on the Western side of America, where the facility with which it flows over the immense tract between that continent and Asia, renders this part of it so smooth as to be called *the pacific*; while the repulsion it meets with on its return to the Eastern side of America, causes the Atlantic to be boisterous, particularly as it approaches the great bank at Newfoundland, where it escapes between the Western isles. 3. A regular swell, once in 12 hours, commonly called the tide. See Tides.

Till the time of the Emperor Justinian, the sea was common and open to all men. The emperor Leo first allowed such as were in possession of the lands, the sole privilege of fishing before their respective territories, exclusive of all others.

Having noticed the Mediterranean sea in its proper place, we shall here refer briefly to the other chief seas, beginning with the Northern or Frozen sea, Mare Hyperboreum, which extends from 52° or 53° North latitude to the polar region. Between the Eastern coasts of Great Britain, and the coasts of Denmark and Norway, northward to the Shetland islands, it forms a gulf called the German sea, Mare Germanicum. At the southern extremity of Norway, an arm of that sea almost environs Denmark. Stretching East and North-East it is called the Baltic, Mar de Belt, and extends from South to North 300 leagues, including the gulf of Bothnia. The small gulfs of Finland and Livonia lie to the Eastward; and the former, by means of the Ladoga and Onega lakes, has a communication with the White sea. These gulfs receive the Oder, the Vistula, the Niemen, and the Dwina, together with many rivers which descend from Lapland and Sweden, Finland and Livonia. An inland gulf, eastward from Russian Lapland, is called the White sea, into which twelve or thirteen considerable rivers discharge themselves. At the north-west extremity of Russia, the strait of Waygatz, in 70° North latitude, was long considered by geographers as a passage into the sea, or gulf, that lies eastward along the coast of Grand Tartary: but the navigation of this strait is now found to be impracticable, on account of the shoals of ice floating in those parts. To pass into the eastern ocean by the north of Nova Zembla, is equally impossible, because an immense field of ice precludes all access, in this way, from Europe to the East Indies.

From North Cape in Lapland, the Frozen sea stretches Westward along the coast of Greenland. Repelled by the coast of Labrador, it turns northward to form an immense gulf, large tracts of which are distinguished by different names, as Hudson's Bay, Davis's Strait, and Baffin's Bay.

The distance between North Cape and the north-east extremity of Tartary is about 155 degrees, or 3,300 English miles. A line from that extremity across the Caspian and Red Seas to the Cape of Good Hope, M. Buffon observes, is about 3,600 Parisian leagues; and no other line of equal extent is to be found in the old continent. From North Cape to the south extremity of Africa are 2,500 leagues.

The Indian sea extends from the African coast eastward to the New Philippine islands; and the eastern coasts of New Guinea and New Holland, bounded on the north by Asia, and on the south by the frozen region towards the pole. From the mouth of the Arabian Gulf to the Cape of Good Hope, the coast inclines south-west without any remarkable gulf or bay.

Between the coasts of Africa and Malabar, lies Mare Erythræum, the Red sea, by the Turks called the sea of Mecca, that has four arms or gulfs. 1. The Red sea, or Arabian gulf, properly so called, which extends about 600 leagues north north-west from the island of Socotora, and receives its name from the colour of the rock, along the coast. 2. The Persian gulf, between Arabia and Persia. 3. The gulf of Indus, or Scindi, at the mouth of a cognominal river. 4. The gulf of Cambaia on the coast of Guzarat.

Beyond the peninsula of India, are the gulfs of Bengal, Siam, Tonquin, Coree, and Japan. From China the coast inclines north-east, and north to the extremity of Tartary, or Beering's strait; and the adjacent sea is distinguished by the general appellations of the sea of Japan, and of Ochutsk. That coast, it has been conjectured, antiently extended southward from Kamtschatka to New Holland; but, in process of time, the Pacific Ocean, by its constant progress from East to West, has gained upon it, and left no traces of that part of the continent, some mountains and elevated tracts excepted, which now form small islands.

3. The South sea or Pacific ocean, is bounded on the west by New Holland and the New Philippine isles, on the north and east by Beering's

strait and the American continent, on the south by the frozen region towards the pole. Southward of the equator it is diversified with numerous groups of islands, many of which have been recently explored.

4. The Atlantic sea, was anciently called Æquor or Mare Atlanticum, from Atlas a group of mountains on the Western coast of Mauritania; Mare Magnum, from its vast dimensions; and Mare Tenebrosum, i. e. the dark and stormy sea. Several divisions of it along the coast are distinguished by particular appellations hereafter mentioned. It is bounded on the east by Africa and Europe, and on the west by America. That part of it which lies south of the equator is commonly called the South sea.

The western coast of Africa, from the Cape of Good Hope north to Cape Negro, has no inflexions or sinuations. Between Cape Gonzalvez, and Cape Tres Puntas there is an open gulf. From the equinoctial line the Atlantic extends along the coasts of Africa, Portugal, Spain, France, and Germany to about 52° north latitude. Between the north coast of Spain and Bretagne, i. e. between Cape Ortegal and the isle of Ouessant near Brest, lies the Bay of Biscay.

The Propontis, or Marmora, is a small tract of sea between the Mediterranean and the Euxine. The latter, from the north-east, sets into it with a strong current through the Bosphorus Thracius, or Mysius, the straits of Constantinople, and the surplus of its water is discharged by the Hellespontus, Dardanelles, into the Ægean sea. It is bounded on the East by Bithynia, and on the west by Thrace; and it contains several islands of no estimation.

The Euxine, Mare Majore, or Black sea; anciently called Caucasium, Scythicum, Sarmaticum, Cymmerium, Tauricum, Colchicum, &c. has been considered by some geographers as a gulf of the Mediterranean, with which it has a communication by the sea of Marmora. It extends from 47° 5′ to 70° 40′ east longitude, i. e. 780 English miles; and its mean breadth is 3½ degrees nearly, or 240 miles. It receives many rivers, as the Danube, the Nieper, the Don, the Ermak, the Sangari, &c. The Don forms a lake, or small gulf, on its northern coast, called Palus Mæotidæ, or sea of Asoph, 300 by 60 or 70 miles. The south coast was accurately surveyed by the ancients, and is described with great exactness by Arrian in his Periplus.

The Caspian sea, by the ancients called Mare Caspium, Hyrcanium, Magnum, and Ponticum; by the Moors, Bohar Corsun, Bachu, Giorgian, Teberstan, &c.; by Edrisi, the sea Khosar, and Tavisthan; by Persians Derjakulsum; by Armenians Soof; and by Russians Glasenskoi-more; lies between 37° and 47° north latitude; its length being 690 miles, and its mean breadth 3½ degrees, or 180 miles. Its superficial contents amount to above 36,000 square miles.

Sea, *luminous appearance of*; it is found that light is one of the first substances that flies off from bodies during their decomposition, hence it can only be obtained from putrescent fishes, or pieces of fishes in a putrescent state or stage of incipient putrefaction; for after putrefaction is completed light escapes no longer in a visible form, either forming new combinations with the other gases, that are now escaping, or perhaps have entirely escaped already. The matter of light is found to be adhesive, and will continue attached to the surface of the body that has admitted it, or to the fingers or other substance to which it is transferred by scraping. Now the vast mass of the ocean contains in itself whatever has the greatest tendency to the production of such a phenomenon. It is the natural province of the greater number of those animals that secrete light from peculiar organs with which they are endowed for this purpose. The sea contains in its immense bosom at all times an enormous quantity of that kind of animal matter (marine fishes) which is most disposed to throw forth its latent light in an aggregate and visible form, during its first progress of decomposition, and unites the different circumstances which chiefly favour such an evolution, such as a fluid menstruum, temperate warmth and a solution of muriate of soda or common salt. If then we see in rotten wood, a certain portion of light poured forth in a visible form; if we see it issuing in a still greater degree from bones and shells that have undergone the process of calcination; if we see it still more freely at times thrown forth from the animal exuviæ of church-yards, and adhering to the surface of the spot from which it issues, how much more easily may we expect to see it thrown forth, and in still larger quantities, from different parts of the ocean, under circumstances that may favour its escape, often adhering to the sides of the vessels, or to the oars, as they are raised from the water, producing a long line, or extended sheet of wonderful brilliancy.

SEA-*marks*. See **BEACON**.

SEA-*plants* belong to the class *cryptogamia*, and the order of *algæ*. Some, as the *fuci* and marine *ulvæ*, are immersed in the sea, are sessile, and without root. The marine *conferva* are either sessile or floating.

SEAL, in zoology, an amphibious animal inhabiting the Caspian Sea, and many of the coasts of the ocean. It affords food to the people who live where it is found; and furnishes articles of commerce in its blubber and hairy-skin. It has two members, serving both as feet and as fins, by means of which it comes on shore; where the method of taking it is, by knocking it down with a long club. This creature is gregarious, and when attacked, its companions come to its assistance. Their courage, however, only enables the fisherman to increase his booty.

SEAPOYS, or **SEPOYS**, native troops of Hindostan, serving the European merchants.

SECANT, see **TRIGONOMETRY**.

SECEDERS, a sect of Christians, dissenting from the Church of Scotland, chiefly on the question of ecclesiastical government.

SECOND-SIGHT, or a sight super-added to the natural, a faculty of which certain superstitious and hypocondriac persons in Scotland have supposed themselves possessed. There is nothing in the stories of these people that differs materially from those of nervous patients in general; but in this case, the vagaries of the brain are supposed to be prophetic. Second-sight is an impression made either by the eye upon the mind, or by the mind upon the eye, by which things distant and future are perceived, and seen as if they were present. A man on a journey, far from home, falls from his horse; another, who is perhaps at work about the house sees him bleeding on the ground, commonly with a landscape of the place where the accident befals him. Another seer, driving home his cattle, or wandering in idleness, is suddenly surprised by the appearance of a bridal ceremony, or funeral procession, and counts the mourners or attendants, of whom if he knows them, he relates the names, if he knows them not, he can describe the dresses. Things distant are seen at the instant they happen.

These visions are not confined to solemn or important events; nor is it true, as is commonly reported, that to the second sight nothing is presented but phantoms of evil. The future visit of a mountebank, or of a piper; a plentiful draught of fish; the arrival of common travellers; or, if possible, still more trifling matters than these, are foreseen by the seers.

Secretary, an officer whose duty it is to write letters and other instruments, for and under the orders and authority of his master.

Secretary *of State*, in British polity, an officer of the crown who transacts all political business. There are three principal secretaries of state. They are members of the privy-council, and have authority to commit persons for treason, and other offences against the state, as conservators of the peace at common law, or as justices of the peace throughout the kingdom.

Secretion. In the course of the circulation the blood is conveyed to certain organs named glands, and is there entirely changed in its chemical composition, so as to form various products not pre-existing in the mass of blood, and which form some of the most important varieties of animal matter.

Sect, a collective term for a body of people adhering to some philosophical or religious system.

Secular, temporal, in opposition to ecclesiastical, or more properly, worldly, in opposition to monastic. The word, in its plain sense, is applicable to that which is "of an hundred years," or "an age;" as the secular games of Rome, which were celebrated once in an age, ; but, metaphorically, it is made to denote things of the age, of the world, of this transitory life.

Seed, in botany, the last produce of a plant, containing a new one in itself. The process of vegetation from a seed to a plant, is simply that of expansion. Flowers, and their form and colours, are all adapted to the maturation of the seed of the plants.

Seeds are naturally disseminated by four different means; by rivers and running waters; by the winds; by animals which feed upon them; by an elastic spring in the pods.

Seeks or **Seiks**, people of a religion founded in Hindustan, about four centuries ago; by Naneekshah, who left a book of doctrines, written in verse. He teaches the existence of one God, filling all space, and pervading all matter; the immortality of the soul, and the future reward of virtue and punishment of vice: forbids the vices universally recognized by the human heart as such; and inculcates the practice of all the virtues. He commands universal toleration, condemning even religious controversy.

Selenites, in natural history, the name of a large class of fossils; in chemistry, a species of plaster of Paris.

Selenography, a branch of cosmography which describes the moon as geography does the earth.

Seleucidæ, in chronology. Æra of the Seleucidæ, or the Syro-Macedonian æra, is a computation of time, commencing from the establishment of the Seleucidæ, a race of Greek kings, who reigned as successors of Alexander the Great, in Syria, as the Ptolemies did in Egypt. This æra we find expressed in the book of the Maccabees, and on a great number of Greek medals, struck by the cities of Syria, &c. The Rabbins call it the æra of contracts: and the Arabs the æra of the two horns. According to the best accounts, the first year of this æra falls in the year 312 before Christ, being about eleven or twelve years after Alexander's death.

Seltzer-water, a mineral water which rises at Lower Seltzer, a village in the electorate of Trieves. See Mineral water.

Sennaar, a kingdom of Africa, in the country of Nubia, situated on the banks of the Nile, between Egypt and Abyssinia.

Sense, the external organs of sense are usually classed under five heads, viz. those of sight, of hearing, of feeling, of smell, of taste. The external organs of sense, the nerves and the brain, are the organs of sensation. If the external organ be destroyed no sensation can be produced: where there are no nerves there is no sensation: where the nervous branches are most numerous there is most sensation: if the nerve be destroyed, sensations cannot be produced from those parts to which the nerve belongs, which are further from the brain than the injured parts. All the nerves terminate in the brain. If the brain is compressed, sensation is suspended. If the brain is considerably injured sensation ceases. Sensations are the rudiments and elements of our ideas, that is, of all our thoughts and feelings. In the earliest exercise of the sensitive power, sensations are simple, uncompounded with the relicts of former corresponding sensations, but the sensations soon become perceptions, that is they instantaneously recal the relicts of other corresponding sensations. The accuracy and extent of the perception depends on the vividness and efficaciousness of the compound sensations, and the number of them received from the same or similar objects in different situations, and through the medium of different senses. The object therefore of early education should be to invigorate the organs of sense.

Sepia, in natural history, the *cuttle-fish*, a genus of the Vermes Mollusca class and order, of which there are eight species: inhabitants of various seas. The Sepia Officinalis inhabits the ocean, and is the prey of the whale tribe and plaise; its arms are also frequently eaten off by the conger eel, and are reproduced. The bony scale on the back is that which is sold in the shops, and which, when reduced to fine powder, is reckoned excellent for the teeth, as well for keeping them white as for preserving them. It is also used as pounce. These animals have the power of squirting out a black fluid, resembling ink, which is said to be an ingredient used in the composition of Indian ink. They deposit their eggs upon sea-weed, which resemble a bunch of grapes. When first deposited they are white, but when impregnated by the male they become black; they are round, with a little point at the end, and in each of them is inclosed a living cuttle-fish, surrounded with a gelatinous fluid. The flesh is used as food by the Italians.

September, the ninth month of the modern year, but the seventh of the Roman, whence its name.

Septuagint, or the LXX, a name give to a Greek version of the books of the Old Testament, from its being considered as the work of seventy-two jews, who are usually called the *seventy interpreters;* seventy being a round number. The authenticity of this version is much contested.

Sequin, or zecchin, a coin struck at Venice and in Turkey.

Seraph, in theology, an angel of the highest order. The seraphim are thus called from their being peculiarly inflamed with divine love, owing to their nearer and more immediate attendance on the throne of God; and which fervour they communicate to the inferior spirits.

Serge, a woollen quilted stuff, of which there are different kinds, denominated from their qualities, or the places of their manufacture. The process of making serge has a general resemblance to that of the cloth manufacture.

Sergeant-*at-law*, the highest degree taken at common law, as that of *doctor* is of the civil law. Sergeants-at-law, or *of the coif*, or *cap*, which they are supposed to wear beneath their wigs, are more particularly appointed to plead in the court of common pleas, where the common-law of England, in which they are regarded as peculiarly conversant, is most strictly observed. They are not restrained, however, from pleading in any other court, where the judges, who cannot fill their office before they are sergeants themselves, call them *brothers.*

Serjeant *at árms*, or at mace, an officer appointed to attend the person of the king, arrest persons of quality that offend, &c. A similar sergeant attends the lord chancellor; a third, the speaker of the house of commons; and a fourth the lord-mayor of London, on solemn occasions.

Common *sergeant*, an officer of the city of London, who attends the lord-mayor and court of aldermen on court-days, and is in council with them on all occasions. He is, more particularly, to take care of the orphans' estates.

Serpentes, in natural history, an order of the amphibia, containing seven genera. Serpents are distinguished as footless amphibia. Serpents are cast naked upon the earth, without limbs, exposed to every injury, but frequently armed with a poison the most deadly and horrible, which is contained in tubular fangs resembling teeth, placed without the upper jaw, protruded and retracted at pleasure, and surrounded with a glandular vessel by which this fatal fluid is secreted. Only about a fifth part of all the serpents are armed with poison, and all cast their skins. Some serpents are viviparous, that is bring forth their young alive, as the rattle snake, while those which are innoxious are oviparous, depositing their eggs in a kind of chain, in any close warm situation, where they are afterwards hatched.

Session *of parliament*, the season and space between its meeting and its prorogation.

Sessions, *court of Quarter*, in British polity, a court held in every county, and most corporate towns, once in every quarter of a year. It is appointed to be in the first week after Michaelmas, the first week after the Epiphany, the first week after the close of Easter, and in the week after the translation of Saint Thomas the Martyr. It is held before two or more justices of the peace. It seldom tries greater offences than small felonies within the benefit of clergy.

Both in corporations and counties at large, there is sometimes kept a special or petty sessions, by a few justices, for dispatching smaller business between the quarter sessions; as licensing alehouses and passing the accounts of parish officers.

Settlement, *act of*, in British history, a statute 12 and 13 Will: III. whereby the crown was fixed in the house of Hanover, and new liberties obtained on behalf of the people.

Sexagesima, the second Sunday before Lent, or the next to Shrove Sunday: so called as being about the 60th day before Easter.

Sextant, in mathematics, denotes the sixth part of a circle, or an arch comprehending sixty degrees. The word sextant is more particularly used for an astronomical instrument made like a quadrant, excepting that its limb only comprehends sixty degrees. The use and application of the sextant is the same with that of the quadrant. See Quadrant.

Shaft, in architecture, the pillar of a column, or the body between the base and capital.

Shaft, in mining, the pit or hollow entrance into a mine.

Shagreen, or **Chagreen**, in commerce, a kind of grained leather, prepared, as is supposed, of the skin of a species of squalus, or hound-fish, called the shagree, or shagrein, and much used in covering cases, books, &c. It is imported from Constantinople, Tauris, Tripoli, Algiers, and from some parts of Poland, where it is prepared in the following manner: the skin being stretched out, is first covered over with mustard seed, which is bruised upon it: and being thus exposed to the weather for some days, it is then tanned. The best is of a brownish colour, as the white sort is the worst: it is extremely hard; yet, when steeped in water, it becomes soft and pliable; and being fashioned into case-covers, it readily takes any colour, as red, green, yellow, black, according to the fancy of the workman.

Shaik, or **sheik**, (an old man or elder) a name denoting a lord or man of eminence in Asia and Africa.

Shamois, **chamois**, or **shamoy**, a kind of leather, either dressed in oil, or tanned, much esteemed for its softness, pliancy, and a quality of bearing soap without injury. It is prepared from the skin of a wild goat, called *chamois*, inhabiting the mountains of Dauphiny, Savoy, Piedmont, and the Pyrenees. The true chamois leather is counterfeited with common goat, kid, and sheep-skins; the art makes a particular profession.

Shanscript, or **sanscript**, a sacred and dead language, in which the religious writings of the Bramins are extant.

Shaster, **shastah**, or *bedang*, the name of the writings received in Hindûstan as penned or inspired by the Deity. The followers of the bedang-shaster (for there are other *shasters*, which they reckon spurious) do not allow that any physical evil exists: they maintain that God created all things perfectly good; but that man, being a free agent, may be guilty of moral evil, which may be injurious to himself, but can be of no detriment to the general system of nature. God, they say, being perfectly benevolent, never punished the wicked otherwise than by pain and affliction, which are the natural consequences of evil actions; and hell, therefore, is no other than consciousness of evil.

SHAWL, a woollen handkerchief, originally manufactured in India exclusively, and most beautifully in Cashmire. Mr. Knights, of Norwich, is said to manufacture shawls of greater breadth than any previously woven in this country, and the quality can scarcely be distinguished from those of India.

SHEAVE, or SHEEVE, in naval affairs, the wheel on which the rope works in a block; it is generally formed of lignum vitæ, sometimes of brass, and frequently, the interior part, or that which sustains the friction against the pin is of brass, let into the exterior which is of lignum vitæ.

SHEEP, in zoölogy, an animal of the utmost value to mankind. The sheep supplies food, clothing, and many other articles of life. Of its wool is made worsted and various cloths; of its skin, leather, parchment, and glue; of its tallow, candles and soap; of its horns, buttons, and various other articles; of its trotters, a useful oil, and sometimes food; of its bones, an ash which is an essential ingredient in artificial stone; a fluid from which glauber salts and a succedaneum for hartshorn are obtained; a crystallizing vapour which produces a salt substituted for sal-ammoniac; and its flesh is a staple source of nourishment

Sheik, in Egypt, a priest of a mosque, answering to an *imam* in Constantinople.

Shelf, among miners, the same with what they otherwise call fast ground, or fast country, being that part of the internal structure of the earth which they find lying even, and in an orderly manner, and evidently having retained its primitive form and situation, unmoved by the waters of the general deluge, while circumjacent and upper strata have been removed.

Shell, a substance of a stony hardness, composed of carbonate of lime variously combined with animal gluten, and serving for the covering and habitations of different animals, mostly of the order Mollusca; (which see) allowing of the occasional protrusion of part of their naked body. When the eggs of testaceous animals are hatched, the young appears with its shell already formed, and it has then at least one complete turn of the spire and a little more; but at this period the shell is extremely thin. A body may increase in volume in two different ways. Either the particles of which it is composed, pass through that body by means of circulation, and undergo certain changes by which they are prepared to form part of the body: or the particles of which a body is composed may unite with it by juxtaposition, without any previous circulation or preparation within the body, to the increase of which they are destined. It is in the first way that the growth of vegetables and animals is accomplished: the second is the mode by which shells receive new additions of matter, and enlarge in size. The first is the mode of increase peculiar to living organized substances: by the second inorganized substances receive new additions of matter and increase of volume. These afford sufficient characteristic marks for a natural division of bodies into organized and inorganized substances. The experiments of Reaumur have decisively proved that the growth of shells is owing to the latter mode of increase: they are enlarged by receiving new additions of matter, after it has been excreted from the body of the animal, and not by a circulation through the body of the shell itself.

The various tints of different colours, with which shells are so beautifully adorned, result, it should seem, from an economy and organization somewhat similar to that which has been mentioned. On the neck of the animal, that part from which the matter of the shell is supposed to be secreted, the colours of the shell may be detected; the colouring matter appearing to be deposited with the other substances of the shell. Although the colours are thus disposed by the animal, the action of light appears to have a considerable effect in augmenting their brilliancy; climate also occasions considerable differences in this respect; hence the shells obtained from the torrid zones are much more rich in their colouring than those which are found in the more temperate zones. The air and water, no doubt have some effect in determining the variety of colours, but as many shells, situated in precisely similar circumstances as to these particulars, vary much as to the disposition of their marks, there must be certain peculiarities and modifications in the parts of the different animals, which prepare the shelly matter; and these peculiarities, although imperceptible to, and undeterminable by us, must be regulated with astonishing uniformity in all individuals of the same species, though ever varied with beauty and elegance in different species.

Shelves, in naval affairs, a general name given to any dangerous shallows, sand-banks, or rocks, lying immediately under the surface of the water.

Sheriff, or **Shire-reeve**, in English polity, the bailiff of the shire or bailiwic, a judicial and ministerial officer in each county of England, nominated by the king (except in Westmoreland, where the office is hereditary) and ranking above all persons in the county during his office.

The sheriff acts, 1. as a judge, 2. as a keeper of the king's peace, 3. as a ministerial officer of the courts of justice, and 4. as the king's bailiff.

1. He is to hear and determine all causes under 40*s*. and in various other civil cases. He is likewise to decide the election of knights of the shire (subject to the controul of the House of Commons), of coroners, and verdurers; to judge of the qualification of voters, and to return such as he shall determine to be duly elected.

2. He is the first magistrate of the county: and, both in pursuit of civil offenders and of foreign invaders may call upon every one therein to assist him: an act which is termed *raising the posse comitatus* or *force of the county*.

3. As a minister, he is bound to execute all processes issuing from the king's courts of justice. In the commencement of civil causes, he is to serve

called, and the usher counts the horse-shoes and nails, and being asked how many shoes? answers six; the remembrancer proclaims "a good number." The usher is then asked "how many nails?" and answers, "sixty-one." The other officer in like manner proclaims "a good number." The business being over, Mr. Recorder invites the cursitor baron in the name of the sheriffs to dine with them; and the ceremony being finished the procession returns in the same manner as upon presenting the lord-mayor.

Sheriff, or **Zeriff**, among the Mohammedans, those who, as descendants of the prophet, wear the green turban; such is the sheriff of Mecca.

Shield, in armoury, a weapon of defence, worn upon the arm, to fend off lances, darts, and hand-arms. The surface, or as it is called in heraldry, the field, of the shield, or escutcheon, appears to have been in all ages decorated with figures emblematical or historical, serving to express the sentiments, record the honours, or at least distinguish the person of the warrior.

Shilling, in the English coinage, a piece of silver equal in value to twelve pence and to the 21st part of a guinea. The word is supposed, by some, to be derived from the Latin *silicus*, which signifies a quarter of an ounce, or the 48th part of a Roman pound. In support of this etymology, it is alledged that the Saxon shilling was also the 48th part of the Saxon pound. At the time of the conquest, the shilling was worth four-pence. Afterward, the French *solidus* of 12 pence, which was in use among the Romans, was called by the name of *shilling*; and the Saxon shilling of four-pence took the Norman name of *groat* or *great coin*, because it was the largest English coin then known.

Ship, a general name for all large sea-vessels, particularly those furnished with three masts and a bow-sprit. Ships are equipped either for war or for commerce. The largest merchant-ships are the East-Indiamen.

Ship-money, in English history, an ancient impost upon the ports, towns, cities, boroughs, and counties of the realm, for providing ships for the king's service.

This demand was revived by Charles 1, in the years 1635 and 1636; but, by statute in the 17th year of his reign, declared illegal.

Shire, in English polity, the same with county. The word, which was originally spelt *scir* or *scire*, signifies a division. Alfred is said to have made those divisions, which he called *satrapias*, and which took the name of *counties* after *earls*, *comites*, or *counts* were set over them. Alfred subdivided the satrapias into *centurias* or *hundreds;* and these into *decennas*, or *tenths of hundreds*, now called *tithings*.

Shore, a place washed by the sea, or some large river: the sea-shore has been divided by some writers into three portions, the first of which is that tract of land which the sea just reaches in storms and high tides, but which it never covers: the second part of the shore is that which is covered in high tides, but is dry at other times, and the third is the descent from this, which is always covered with water.

Shorl *electric*, a stone that was first found in the island of Ceylon, but is now obtained from many mountains in different parts of the world. When heated to 200° of Fahrenheit, it becomes electric, one end negatively and the other is positive.

Shot, in the art of war, a general name for every kind of ball or bullet, small and large, made to be exploded by fire-arms.

"Method of casting hail-shot." The lead being melted and a quantity of orpiment sufficient to make the drops assume a clean spherical form, being added, the mixture is poured through a concave copper-plate, three inches in diameter, and bored through with 30 or 40 small holes, into a tub of water, four inches above which it is fixed.

"Bar-shot," two bullets or rather half-bullets, joined together by an iron bar, and intended for destroying masts, sails, and other parts of the rigging of ships.

"Chain-shot," two bullets joined together with links.

Siderial *day*, the time in which any star appears to revolve from the meridian to the meridian again, which is $23^h\ 56'\ 4''\ 6'''$ of mean solar time: there being 366 siderial days in a year, or in the time of 365 diurnal revolutions, of the sun.

Siege, in the art of war, the encampment of an army round a place, with design to take it, either by reducing it by famine, or conquering it by assault, or other modes of attack.

Sights, *of a quadrant*: thin pieces of brass raised perpendicularly on its side, or on the index of a thedolite or circumferentor. They have each an aperture or slit up the middle, through which the visual rays pass to the eye, and distant objects are seen.

Sign, the character that distinguishes a twelfth person of the zodiac.

"Vernal or spring signs," Aries, Taurus, and Gemini.

"Æstival or summer signs," Cancer, Leo, and Virgo.

"Autumnal signs," Libra, Scorpio, Sagitarius.

"Brumal or winter signs," Capricornus, Aquarius, and pisces.

Sign-*manual*, in English polity, the royal signature: in a general sense, it is the signature of any one's name in his own hand-writing.

Signature, in printing, is a letter put at the bottom of the first page at least, in each sheet, as a direction to the binder, in folding, gathering, and collating them. The signatures consist of the capital letters of the alphabet, which change in every sheet; if there be more sheets than letters in the alphabet, to the capital letter is added a small one of the same sort, as A a, B b, which are repeated as often as necessary. In large volumes it is usual to distinguish the number of alphabets after the first two by placing a figure before the signature, as 3 B, 4 B, &c.

Silica, in mineralogy and chemistry, is generally found in a stony state, and from its forming nearly the entire composition of flint, it has acquired the name of silica, silex, or siliceous earth. This earth exists in great abundance in nature, and it constitutes the basis of some of the hardest stones of which the nucleus of the globe consists; and, on account of its great abundance, it has been regarded as the primitive or elementary earth, the base of all the other earths.

Silk, a very soft, bright and delicate thread, produced by the *bombyx* or silk-worm. The first silk known in Europe appears to have been brought from a part of China. Though this commerce began in a very early age, it was not before A. D. 555 that the arts of rearing the worms and working the silk were known to the western world. At this period, two monks brought the secrets from the Indies, and manufactories were set up at Athens, Thebes, and Corinth.

Silk-worm, or bombyx, a caterpillar which passes through the changes common to creatures of this class, and which, previously to its assuming the state of *pupa* or *chrysalis*, forms itself a bed of fine silk. This silk being regularly wound about the bag in which the pupa is contained, admits of being unwound with equal regularity, and is found to consist of a continued thread, equal in length, as it is computed, to six English miles.

From a small egg, of the size of an ordinary pin's head, proceeds a minute dark-coloured worm. the food of which is the mulberry-leaf. After casting its skin three or four times, as its bulk increases, it becomes at length rather a large caterpillar, of a white colour, more or less tinctured with blue or with yellow. The period of its existence in this state being arrived, it ceases to eat, and soon begins to form the silken ball which renders it so famous. On the first day of its work, it makes the web, or loose outward silk by which it fastens its nest to the branch, paper, or other substance that nature or art puts in its way. On the second day it begins to form its *folliculus* or ball; and on the third is quite hid by its silk.

At the end of ten days, the work is finished, and the transformation of the insect complete. In a state of nature, every thing now remains quiet till the pupa becomes a *phalæna*, or moth: but where the insect is bred as an article of trade, the ball is taken from the mulberry tree in the condition at which it is now described to be arrived, and unwound within a proper time; because if left to itself, the phalœna would pierce its way through, and destroy the silk.

As soon as the worms have produced their balls, or cocoons, they become an article of trade, for in those countries where silk is cultivated few persons reel off their cocoons, but sell them to others, who make this operation a separate business. The silk, as formed by the worm, is so very fine, that if each ball, or cocoon, was reeled separately it would be totally unfit for the purpose of the manufacturer, in the reeling, therefore, the ends of several cocoons are joined and reeled together out of warm water, which, softening their natural gum, makes them stick together so as to form one strong smooth thread. As often as the thread of any single cocoon breaks or comes to an end, its place is supplied by a new one, so that by continually keeping up the same number, the united thread may be wound to any length; the single threads of the newly added cocoons are not joined by any tie, but simply laid on the main thread, to which they adhere by their gum; and their ends are so fine as not to occasion the least perceptible unevenness in the place where they are laid on. The agparatus for reeling consists merely of a small open kettle of water, under which is a fire to keep it hot, and a reel of a very simple construction.

Silver, a white metal, valued for fineness, purity, and ductility, inferior only to gold. Like gold, it is found in every part of the world; but the places in which it abounds sufficiently to be of value are few. The mines of Peru, and other parts of America, which are in the possession of the Spaniards, but worked by enslaved Americans, are the richest and most abundant in the world. Many millions of men have perished in them, and prodigious numbers continue to be destroyed by their poisonous exhalations.

It is a singular fact that the situations of gold and silver mines should often be diametrically opposite in point of temperature. Gold is common in the hottest parts of the earth, while silver is generally met with in cold regions. Thus the chief parts of the world where silver is to be met with are Sweden, Norway, and the higher latitudes near the pole: if we find it in hot climates, it is rarely on level ground, but on the tops of mountains that are perpetually covered with ice and snow. The principal silver mine in Europe is that of Konigsberg, in Norway, to the north of Christiana. But it is in the centre of the Andes, in situations which, though immediately exposed to the perpendicular rays of the sun, are constantly covered with snow, that nature has most abundantly distributed this metal. In twenty degrees of southern latitude, within the torrid zone, we find the famous mountain Potosi, situated near the source of the Rio de la Plata. This mountain is one of the most consi derable in Peru; its height is immense, and it appears from the description of travellers, that from top to bottom it is full of veins of silver. The mountain of Potosi from the year 1545, when it was first discovered, till the year 1638, that is in 93 years, yielded four hundred millions of ounces of silver.

Silver, as is well known, is of a fine white colour, of great brilliancy, and of a specific gravity equal to between 10 and 11. It is not hard as iron, but harder than gold. It is very elastic, and one of the most sonorous of metals.

Silver *tree*, or *arbor Dianæ*, is the result of a curious experiment in chemistry, by which the branches and figure of a tree are represented by an amalgam of silver and mercury, which appear to vegetate in a very beautiful manner. To obtain it, one part of silver, dissolved in nitrous acid to saturation, is mixed with twenty parts of clean water, and poured upon two parts of mercury. When left standing quietly, the desired crystallization will take place after some time. A cylindrical glass vessel is best suited for the purpose; and that the process may succeed, it is necessary that the ingredients be in their utmost purity.

Silurus, in natural history, a genus of fishes of the order Abdominales. There are about thirty species of this fish. The Silurus Electricus is the most singular: it is found in the rivers of Africa, is about twenty inches long, of a pale ash colour, with a few blackish spots towards the tail; when touched it communicates a shock attended with trembling and pain of the limbs, but less violent than that of the torpedo.

Simia, the *ape*, in natural history, a genus of the class Mammalia, of the order Primates. Animals of this genus are commonly divided into such as have no tails; such as have only very short ones; such as have very long ones, and such as have prehensile tails, with which they can lay hold of any object at pleasure. There are upwards of sixty species of this genus, of which we shall notice the Simia Satyrus, or Orang-Outang only. This animal is said to grow, in its native woods of Africa and India, to the height of six feet; and to subsist, like most other species, on fruits. It flies from the haunts of mankind, leads a solitary life, and displays great strength, agility, and swiftness, which render it extremely difficult to be taken. It has been known to attack and destroy Negroes wandering at a distance from their habitations, and to carry off women to its wretched habitation, watching them with such extraordinary vigilance, as scarcely to admit the possibility of their escape. Its general resemblance to the human figure and countenance is particularly and mortifyingly strong, yet minute observation and dissection have pointed almost innumerable differences, the detail of which is here impossible. It is capable of being tamed and domesticated, and, many years since, one was exhibited in London, which had been disciplined to sit, and work, and eat, like a human being, using a knife and fork for the latter purpose. Its disposition was pensive; its manners were gentle; and it appeared to possess, for its keepers, and those to whom it had been long familiarized, a high degree of genuine gratitude and attachment.

Simony, the crime of trafficking with sacred things; particularly of purchasing church benefices with money. The word is formed from Simon, the name of an impostor, contemporary with the apostles of Jesus, and who offered to buy of them the power of working miracles.

Sine-cure, a church benefice without cure, or care, or guardianship, of souls; as where there is a parish without church or inhabitants. The word is applied to any post that brings profit without labour.

Sine-die, in parliamentary language, a Latin phrase used for the adjournment of a debate without fixing a day when it shall come on again, and which amounts to dismission of the subject.

Sinking *fund*, a portion of the public revenue set apart to be applied to the reduction of the public debts.

Sire, a title of courtesy, which in Britain is given to the king, as it formerly was in France.

Siren, in natural history, a genus of Amphibia, of the order Reptiles, of which there are three species, though according to Gmelin only one, viz. the Siren Lacertina, which is eel shaped, and is found in muddy and swampy places in South Carolina: lives generally under water, but sometimes appears on land. It is of a singular structure, between the amphibious and fish tribe, being furnished with external gills like the latter, and feet like the former: it has a sort of squeaking or singing voice: when thrown violently on the ground it breaks in pieces like some serpents. The Siren Anguina, or Anguine Siren, is a native of a particular lake in Carniola, from which the water is regularly drained during the summer, when the bottom preduces corn, or pasture. In the autumn the water returns with great rapidity, flowing principally from the springs in the neighbouring mountains. In this lake the Siren is found of the length of eleven inches, and of a pale rose colour. Its habits are predatory, and it subsists on the smaller inhabitants of the water.

SIREX, in natural history, Tailed Wasp, a genus of insects of which there are twenty six species. The larvæ of this genus are six-footed, soft, and cylindrical: they perforate wood, and frequently eat their way into the bowels of other insects, living upon and consuming their vitals: the perfect insect lives on the nectar of flowers.

The largest species is Sirex Gigas, which surpasses the hornet in size, and is principally observed in the neighbourhood of pines. The larva changes into a chrysalis in July, first inveloping itself in a slight silken web of a whitish colour. If the change to the chrysalis state takes place in summer, the fly proceeds from it in about three weeks, but if at the close of autumn, the animal continues in the chrysalis state the whole winter. The eggs are deposited by the female in the decayed parts of trees.

SIRIUS, the *dog-star*, a very bright star, of the first magnitude, in the mouth of the constellation Canis Major, or the Great Dog. This is the brightest of all the stars in our firmament, and therefore probably, says Dr. Maskelyne, the late Astronomer Royal, the nearest to us of them all. Some however, suppose Arcturus to be the nearest. This is one of the earliest named stars in the whole heavens. Hesiod and Homer mention only four or five constellations, or stars, and this is one of them. Sirius and Orion, the Hyades, Pleiades, and Arcturus, are almost the whole of the old poetical astronomy. The three last the Greeks formed of their own observation, as appears by the names; the two others were Egyptian. Sirius was so called from the Nile, one of the names of that river being Siris; and the Egyptians, seeing that river begin to swell at the time of a particular rising of this star, paid divine honours to the star, and called it by a name derived from that of a river, expressing the star of the Nile.

Sirocco, a periodical wind which generally blows in Italy and Dalmatia, every year, about Easter. It blows from the south-east by south; it is attended with heat, but not rain; its ordinary period is twenty days, and it usually ceases at sunset. When the sirocco does not blow in this manner, the summer is almost free from westerly winds, whirlwinds, and storms. This wind is prejudicial to plants, drying and burning up their buds; though it hurts not men any otherwise than by causing an extraordinary weakness and lassitude; inconveniences that are fully compensated by a plentiful fishing and a good crop of corn on the mountains. In the summer time, when the westerly wind ceases for a day, it is a sign that the sirocco will blow the day following, which usually begins with a sort of whirlwind.

Sitta, the Nut-Hatch, in natural history, a genus of birds of the order Picæ. There are 12 species, of which the principal is the Sitta Europea, or the European Nut-Hatch, which resembles the woodpecker in its manners. The food of these birds consists of caterpillars, and all sorts of beetles and insects, as well as nuts, the last of which they are said to hoard, and they crack them by the stroke of their bill with extreme dexterity. The nut-hatch in a state of confinement rarely perch like other birds, but almost always sleep standing on the floor of their cage.

Six-clerks, officers in chancery next in degree below the twelve masters, whose business it is to enrol commissions, pardons, patents, warrants, and other instruments that pass the great seal. They are also solicitors for parties in suits depending in chancery. They were anciently ecclesiastics.

Size, a sort of glue, made of the shreds and parings of leather, parchment, or vellum.

Skins, in commerce, the membranous coverings of animals which are converted to several uses. When employed with the hair remaining on them, they are distinguished by the names of *peltry* and *furr*; when dressed for writing, painting and other purposes, by those of *parchment* and *vellum*; and when tanned, by the general name of *leather*, or the particular name of the leather manufactured, or of the animal from which it was obtained: as *morocco* and *calf-skin*.

Sky, the blue expanse otherwise called Heaven, and the firmament. With respect to its colour, Leonardo da Vinci and M. de la Hire have explained it as resulting from the mixture of white and black which is produced when we see the dark regions of the atmosphere through the light of the sun; but sir Isaac Newton attributes it to the vapours, which, beginning to condense, have had time sufficient to reflect the most reflexible rays, that is the violet ones, but not enough to reflect the rest.

One thing is certain, that whatever be the cause of the blue colour of that space in which the stars move, and which bounds all the visual prospects of this globe, the colour that we see by night and that which we see by day are the same; and that the apparent difference consists in that in the latter case the light is between it and our eyes, and in the former the light is at our backs.

Slate, a kind of stone of a bluish, purplish, or grey colour, which, when first dug from the earth, is of an exceedingly soft texture, and therefore easily cut or split into plates for tables, coverings of the roofs of buildings, and paving. The grey-slate is also called Horsham-stone, because found in the greatest quantity near Horsham in Sussex. Used in the place of tiles, the blue slate is a very light, durable, and beautiful covering: and the grey slate is much more lasting than tiles: but slating of either kind is expensive, because the roof must be first covered with boards, to which the slates are fastened with tacks and fine mortar; and the weight of the grey slate requires that the timbers themselves be stronger than ordinary.

Slave, in warfare, one absolutely in the power of another; in commerce, one who is the property of another. The word is derived from Sclavus, the name of a people of Scythia whom Charlemagne condemned to perpetual bondage, and who are famous in the history of Europe by the title of Sclavonians. Pure and proper slaves do not, and cannot subsist in England, as such, that is, whereby an absolute and unlimited power is given to the master, over the life and fortune of the slave. It is laid down as a maxim, that a slave or negro, the instant he lands in England, becomes a freeman, that is, the law will protect him in the enjoyment of his person and his property. Liberty, by the English law, depends not on the complexion; and what was said even in the time of Queen Elizabeth is now substantially true: "that the air of England is too pure for a slave to breathe in."

Sloop, a small light sea-vessel, with two masts and lug-sails. Sloops are commonly good sailers, and therefore used to attend men of war.

Smack, a small vessel with one mast; such as those sometimes employed as tenders [attenders] upon ships of war, and those used for fishing on the coasts.

Smalt, a blue pigment sometimes used in enamel painting, and among water-colours, but more generally known by the name of *powder-blue*. Smalt is produced from *cobalt*. This mineral being pulverized, and the lighter matter washed away, the remainder is laid on a surface, and heated till it ceases to smoke. It is then cooled, and afterward made into a glass, which is of a blue colour; and which is subsequently ground into that powder called *smalt*, or *powder-blue*.

Smelting, in metallurgy; the fusion or melting of the ores of metals, in order to separate the metalline part from the earthy, stony, and other parts. The art of fusing the ores after roasting, is the principal and most important of metallurgic operations, all the other being preliminary or preparative to this.

Smoke, a humid matter, exhaled in the form of vapour, by the action of heat. Smoke ascends, because it is lighter than the air in which it floats.

SMOKE-*jack*, is a very simple and commodious machine in a kitchen, so called from its being moved by means of smoke, or rather by means of rarefied air, moving up the chimney, and striking against the tail of the horizontal wheel, which being inclined to the horizon, is thereby moved about the axis of the wheel, together with the pinion which carries the chain that turns the spit. The wheel should be placed in the narrow part of the chimney, where the motion of the air is the most rapid, the greater part of which must be made to strike upon the sails.

SNEEZING, or sternutation, a convulsive motion of the expiratory muscles of the breast, caused by an irritation of the upper membranes of the nose.

SNOW, in meteorology, a meteor formed in the middle region of the air, and consisting in the congelation of vapour. A cloud of vapours being condensed into drops, those drops immediately descend: but, meeting with a freezing air as they fall, each is froze into an icicle, shooting itself forth into several points. Continuing their descent, they pass through some partial streams of warmer air, or in their continual waftage to and fro, coming into frequent contact with each other, they are, by their mutual attrition, a little thawed. In their farther progress they entangle, or form themselves into clusters or flakes, and thus alight upon the earth.

Upon examining the flakes, they are found to be chiefly composed of stars of six points, though these are intermixed with various other irregular figures, which are chiefly fragments of the regular ones. Others also, according to the hypothesis above laid down, seemed to have been thawed and froze again into irregular clusters; so that the whole body of snow appears an infinite mass of icicles irregularly figured.

The rarity or lightness of a flake of snow, which is composed of solid ice, is owing to the great extent of its surface in proportion to the quantity of its materials.

Snuff, a vegetable powder, intended to be introduced into the nostrils; where, by stimulating the glands by which the pituita is secreted, it promotes the discharge of that humour. Though the use of snuff is with some persons habitual, and consequently, at best, nugatory, yet there are cases in which it is to be recommended medicinally. The intention of the secretion of the pituita or phlegm from the blood, and its discharge through the nostrils, is one of very great importance. The nose is internally covered with a membrane, throughout which the olfactory nerves are diffused, and it is necessary that this should be preserved in a state of sensibility; but the continual inspiration of air, and expiration of breath, must inevitably occasion a dryness, and from this cause, a hardness and callousness of the part, were it not supplied with a mucus by which its moisture is preserved. That this moisture, which gives softness, is necessary to the susceptibility of the olfactory nerves is evident from this, that whenever, by a cold for instance, the secretion is stopped, and a dryness ensues, the patient complains of a want of smell. The same dryness or insensibility in the palate produces a want of taste.

But from this dryness, or want of discharge of the pituita, another evil arises. The matter, though not discharged, is secreted, and by its retension occasions a sensation of fulness in the head; and by its pressure, added to the want of defence against the action of the air, a sensation of heat in the nostrils.

To promote, by stimulation, therefore, the discharge of the pituita, which retained, clogs the head, and the flowing of which is necessary to the preservation of the olfactory nerves, is the medicinal purpose of snuff.

The common snuffs have the leaves of the nicotiana, or tobacco-plant, for their basis.

Soap, a composition of caustic fixed alkaline salt, and oil or other grease. It is sometimes hard and dry, sometimes soft and liquid; much used in washing, and other purposes, as well in the arts and manufactures, as in domestic purposes. Soap, in this country, is manufactured principally from tallow and other fat, and the alkali employed is either barilla, or pearl-ash, or a mixture of the two.

Soccage, a tenure of lands by, or for certain inferior services of husbandry to be performed to the lord of the fee.

Socinians, a sect of Christians who derive their name and doctrines from Faustus Socinus, a gentleman of Sienna. The peculiar doctrines of Socinus regard the person of Jesus Christ. On the first of these subjects, three opinions are entertained: 1. That he was God, existing from all eternity; 2. That he was a heavenly person, existing "before the world," but not eternally; and 3. That he only began to exist when born of the Virgin Mary. The first is the doctrine of the Trinitarians; the second that of Arius; and the Third that of Socinus. See Arians. Socinus was a strenuous advocate, and even a persecutor, in the cause of the worship of Jesus; on which question and that of the mystery of the incarnation, the *Unitarians* separate from his followers.

Socratic *philosophy*. See Philosophy.

Soda, a substance found in the earth, and which for that reason is sometimes called *mineral alkali*. The properties of soda are nearly similar with those of pot-ash; but the first is found to make better glass and soap than the latter. See Voltaism.

Solar *microscope*: this instrument depends, as we have before observed, entirely on the sun's rays for effect. It consists (see fig. 1, Plate Steam Engine) of a looking glass S O placed outside of a window: a lens $a\ b$ in the shutter $x\ x$, and the lens $l\ m$. These several parts are united to, and fixed in a brass tube. The looking-glass can be turned by an adjusting screw so as to receive the rays of the sun s, s, s, and to reflect them through the tube into the room. The lens $a\ b$ collects those rays into a focus at $l\ m$, where there is another double convex lens: here the rays cross, and diverge, to a white screen on which the image $o\ p$, of any object $c\ g$ will be painted. The object is placed a little behind the focus, for if it were in the focus it would infallibly be burnt, and the magnifying power depends on the distance of the screen from the lens $l\ m$, compared with the distance of the object $c\ g$, from the same lens. See Optics.

lar *system*: Pythagoras, who flourished five ed years before the Christian æra, was un- edly acquainted with the true system of the world: he, in opposition to other philosophers, asserted that the sun was at rest, and that the earth and planets circulated about that luminary as a centre. This theory was so hostile to the prejudices of sense that it made but little progress, and was in truth forgotten: till at length Copernicus, a native of Poland, a bold and original genius, adopted the Pythagorean or true system of the universe, and published it to the world in the year 1543. This doctrine had remained so long in obscurity, that the restorer of it was considered as the inventor, and the system obtained the name of the Copernican philosophy, though only revived by that great man.

But Europe was still immersed in ignorance, and Copernicus had many opponents. Tycho Brahe, in particular, a noble Dane, sensible of the defects of the Ptolemaic system, but unwilling to acknowledge the motion of the earth, endeavoured, about the year 1586, to establish a new system of his own, which was still more perplexed and embarrassed than that of Ptolemy. It allows a monthly motion to the moon round the earth, as the centre of its orbit; and makes the sun to be the centre of the orbits of Mercury, Venus, Mars, Jupiter, and Saturn. The sun, however, with all the planets, is supposed to be whirled round the earth in a year, and even once in the twenty-four hours. This system, notwithstanding its absurdity, met with many advocates. Longomontanus, and others, so far refined upon it, as to admit the diurnal motion of the earth, though they insisted that it had no annual motion.

About this time, after a darkness of many ages, 1st of January, 1801, by M. Piazzi, astronomer-royal at Palermo in Sicily, who called it *Ferdinandea*, in honour of his Sicilian Majesty. It is also called *Ceres* or *Ceres Ferdinandea*. It has its orbit between those of Mars and Jupiter. According to the latest observations, its period is four years 222 days. Its distance from the sun is that of the earth as 267 to 100, consequently above 250 millions of miles. It is not visible to the naked eye; and so small, that glasses of a very high magnifying power will not show it with a distinctly-defined diameter: Dr. Herschel has, however, estimated its diameter at 160 English miles.

Another planet has also been discovered by Dr. Olbers of Hamburg: it is likewise situated between Mars and Jupiter. It has been named *Pallas*. Its distance from the sun is to that of the earth as 280 to 100, or nearly 270 millions of miles. It is extremely small; its diameter being estimated by Dr. Herschel at only 110 miles. Two others have likewise been discovered by M. Harding and Dr. Olbers, named Juno and Vesta; the orbits of all four are between those of Mars and Jupiter.

The magnitudes, annual periods, and mean distances from the sun, of the several planets, are given in the table subjoined. Their relative distances may likewise be thus stated in a manner more compendious and easy to be remembered. If the distance of the earth from the sun be supposed to be divided into ten parts, the distance of Mercury will be four such parts, that of Venus seven, that of Mars fifteen, that of Jupiter fifty-two, that of Saturn ninety-five, and that of the Georgium Sidus or Herschel planet one hundred and ninety.

Besides these seven planets, there are eighteen others which move round four of them in the same manner as they do round the sun. Of these our earth has one, called the Moon; Jupiter has four; Saturn seven, two of these having been lately discovered by Dr. Herschel; and the Georgium Sidus six, discovered, as well as the planet itself, by the same excellent astronomer. These are called moons, from their resemblance to our moon; and sometimes *secondary* planets, because they seem to be attendants of the Earth, Jupiter, Saturn, and the Georgium Sidus, about which they move, and which are called *primary*. See SATELLITES.

The orbits described by the planets are not exact circles, but ellipses or ovals: hence the same planet is not always at the same distance from the sun; and the distance which is exactly between the greatest and least distance is called the *mean distance*.

We have already said that the annual motion of the earth occasions the diversity of seasons: but this would not happen were the axis of the earth exactly parallel to, or in a line with, the axis of its orbit; because then the same parts of the earth would be turned towards the sun in every diurnal revolution; which would deprive mankind of the grateful vicissitudes of the seasons arising from the difference in length of the days and nights produced by this inclination of the axis. The axes of several others of the planets are in like manner inclined to the planes of their orbits.

Besides the primary and secondary planets already enumerated, there are other bodies which revolve round the sun, and consequently make a part of the solar system. These are called *Comets*, and appear occasionally in every part of the heavens. Descending from the far distant parts of the system with great rapidity, they surprise us with the singular appearance of a train, or tail, which accompanies them; become visible to us in the lower parts of their orbits; and, after a short stay, go off again to vast distances, and disappear. Though some of the ancients had more just notions of them, yet the opinion having prevailed, that they were only meteors generated in the air, like to those we sometimes see in it, and in a few moments vanishing, no care was taken to observe or record their phænomena accurately till of late. Hence this part of astronomy is very imperfect. The general doctrine is, that they are solid compact bodies, like other planets, and regulated by the same laws of gravity, so as to describe equal areas in proportional times by radii drawn to the common centre. They move about the sun in very eccentric ellipses, and are of much greater density than the earth; for some of them are heated in every period to such a degree as would vitrify or dissipate any substance known to us. Sir Isaac Newton computed the heat of the comet that appeared in the year 1680, when nearest the sun, to be 2,000 times hotter than red-hot iron, and that, being thus heated, it must retain its heat till it comes round again, although its period should be more than 20,000 years; and it is computed to be only 575. The number of comets is very much greater than that of the planets which move in the vicinity of the sun. From the reports of historians, as well as from the observations of late years, it has been ascertained that more than 450 were seen previous to the year 1771; and when the attention of astronomers was called to this object by the expectation of the return of the comet of 1759, no fewer than seven were observed in the course of seven years. From this circumstance, and the probability that all the comets recorded in ancient authors were of considerable apparent magnitude, while the smaller were overlooked, it is reasonable to conclude that the number of comets considerably exceeds any estimation that might be made from the observations we now possess. But the number of those, whose orbits are settled with sufficient accuracy to ascertain their identity, when they may appear again, is no more than fifty-nine, reckoning as late as the year 1771. The orbits of most of these are inclined to the plane of the ecliptic in large angles, and the greater number of them approached nearer to the sun than to the earth. Their motions in the heavens are not all in the order of the signs, or direct, like those of the planets; but the number whose motion is retrograde is nearly equal to that of those whose motion is direct. All which have been observed, however, have moved through the æthereal regions and the orbits of the planets, without suffering the least sensible resistance in their motions; which sufficiently proves that the planets do not move in solid orbs. Of all the comets, the periods of three only are known with any degree of certainty, being found to return at intervals of 75, 129, and 575 years; and of these, that which appeared in 1680 is the most remarkable. This comet, at its greatest distance, is about 11,200 millions of miles from the sun, while its least distance from the centre of the sun is about 490,000 miles; being less than one third part of the sun's semidiameter from his surface. In that part of its orbit which is nearest the sun, it flies with the amazing velocity of 880,000 miles in an hour; and the sun, as seen from it, appears 100 degrees in breadth, consequently 40,000 times as large as he appears to us. The astonishing distance that this comet runs out into empty space naturally suggests to our imagination the vast distance between our sun and the nearest of the fixed stars, of whose attractions all the comets must keep clear, to return periodically and go round the sun.

The following Table will give the Diameters of the Sun and Planets; the mean distances of the Planets from the Sun; and the time occupied in their diurnal and annual revolutions.

	Diameters in English miles.	Distances from the Sun.	Diurnal rotations round their axes.	Time of revolving round the Sun.
The Sun	813,246		25 d. 14 h. 8 m.	
Mercury	3,224	37,000,000	unknown.	84 d. nearly.
Venus	7,867	68,000,000	23 h. 21 m.	225 d. nearly.
The Earth	7,930	95,000,000	24 h.	365 d. 6 h. 9 m.
Mars	4,189	144,000,000	24 h. 39 m. 22 s	687 d. nearly.
Ceres	160	260,000,000	unknown.	unknown.
Palias	80	260,000,000	unknown.	1703 d. 16 h. 46 m.
Juno*	—	300,000,000		2012 d.
Vesta				
Jupiter	89,170	490,000,000	10 h. nearly	4332 d. 14 h. 27 m.
Saturn	79,042	908,000,000	10 h. 16 m.	10759 d. 1 h. 51 m.
Herschel	35,112	1,800,000,000	unknown.	30737 d. 18 h.

* The distances, magnitudes, &c. of Juno and Vesta have not yet been ascertained.

Solder, a metallic or mineral composition used in joining bodies of metal together.

The different solders are made of the metals to be soldered, mixed with one of a finer quality, and a portion of borax or of rosin.

Soldier, one who serves in an army for hire The word comes from *solidus*, 'solde' or 'pay.'

The vassal differs from the soldier, in that he serves both by compulsion, and at his own cost; the volunteer, in that he serves of his own accord, and without wages.

By common acceptation, however, the term soldier denotes a military man; a warrior.

Solecism, an impropriety of speech where refinement is affected. A *barbarism* is a fault of style resulting from ignorance and rudeness; a *solecism*, one arising from affectation. Shakespeare sometimes falls into the *barbarism*; Ben Johnson into the *solecism*.

The origin of the word was this: a king of Cyprus founded a city called Soli, in which so many Athenian emigrants came to settle, that they permanently influenced the dialect of the natives, whose affected imitation of the language and idioms of Attica, were called *solecisms;* and this phrase became proverbial among the ancients, so that when an actor on the stage at Rome used an affected gesture, the audience exclaimed that he had committed "a *solecism* with his hand."

Solicitor, in law, a person employed to prosecute the suits of others.

Solicitor-*general*, in British polity, an officer of the crown, who holds his place by patent and during the king's pleasure. He is to manage the crown affairs at law. Till the 13th of Charles II. he with the attorney-general had a right, on special occasions, to sit in the house of lords.

cently rebuilt by cardinal de Richelieu. The design of its institution was that of assisting poor students in divinity.

It contained lodgings for thirty-six doctors, who composed the *society of the Sorbonne*. Those admitted into it without being doctors were said to be of the hospitality of the *Sorbonne*. In apartments dedicated to that purpose, six regent-doctors held lectures every day; three in the morning, and three in the afternoon.

Sovereign, or superior, an epithet bestowed on a person or thing that is pre-eminent; as *sovereign* prince; *sovereign* court; *sovereign* remedy. In the ancient French customs, there was a *sovereign* master of the household, a *sovereign* master of the forests, and a *sovereign* master of the treasury.

Soul, in physics and physiology, the active principle, or the principle of life; thus philosophers have spoken of the *soul* of the world, the *souls* of the planets, and the *souls* of the stars; the sensitive *soul*, and the vegetable *soul*.

Soul, in metaphysics, the intellectual principle, immaterial and immortal.

Soul, in the simple sense of active principle, informs unorganized matter; the vegetable soul belongs to plants; the sensitive soul to conscious creatures in general; and the intellectual soul to man.

Sound, see **Acoustics**.

Sound-board, the principal part of an organ, and that which makes the whole machine play.

The "sound-board" or "summer," is a reservoir, into which the wind drawn in by the bellows is conducted by a port-vent, and thus distributed into the pipes placed over the holes of its upper part. This wind enters them by valves, which are opened by pressing the stops or keys, after drawing the registers, which prevent the air from going into any of the pipes in which it is not required.

Span, a measure taken from the space between the end of the thumb and the tip of the little finger, when both are stretched out. The span is estimated at three hand-breadths, or nine inches.

Spar, in natural history, shining species of limestone, found in caves, grottoes, the clefts of rocks, and mines. Spar may be formed in either of these different ways; from steams alone; from steams coagulating dew as it falls on the ground, or waters issuing from the joints of rocks; or it may grow up from earths and clays.

Speaker, in the parliamentary sense, an officer who acts as chairman during a sitting, and *speaks* for and in the name of the whole body, and whenever occasion requires.

Speaker *of the House of Commons*, a member of the house, elected by a majority of votes to act as chairman, or president, in putting questions, reading bills, keeping order, and carrying into execution the resolutions of the house. The first thing to be done by the commons, on the meeting of parliament, is the making choice of a Speaker who is to be presented to and approved of by the king; and such Speaker, on his admission, begs of his majesty that the commons, during their sitting, may have free access to his person; freedom of speech within their own walls; and security from arrests. The Speaker is not to deliver his sentiments upon any question; but he may interrupt a member whose language is indecorous, or who wanders from the subject of debate: he may also stop a debate, to remind the house of any standing order, or established mode of proceeding, which he sees about to be violated. He has no power, however; but submits every thing to the decision of the house.

If the number of votes on the two sides of a question be equal, he may decide it by his own; but otherwise he cannot vote. When the house resolves itself into a committee, the chair is filled by a temporary chairman, and the Speaker becomes a private member, capable of offering arguments.

Speaker *of the House of Lords*, an officer who is usually the high-chancellor, or in his absence, the chief-justice.

Species, a subdivision of a genus, which can itself be farther divided into *individuals*.

Specific *Gravity*, See Gravity.

Spectacle, *show*, a public sight or pageant. The Romans were exceedingly fond of spectacles, which, among them, consisted of comedies, combats of gladiators or beasts, and of solemn processions. Recently the word *spectacle* has been ap-applied with great propriety to such splendid theatrical representations as are equally without the characteristic features of the play and the pantomime.

Spectacles, an optical instrument, consisting of two lenses, made to be applied to the eyes for the assistance of the organs of sight. The lenses of spectacles are either more or less convex, or more or less concave. Convex lenses are used by elderly persons, to make amends for the flatness of the eye which does not cause the rays to converge sufficiently to meet in the retina or choroides; and concave lenses by short-sighted persons, the great roundness of whose eyes occasions the ray to converge before they reach the retina or choroides.

Speculation, in metaphysics, an act of the mind which consists in *looking*, as it were, into the nature of things, in order to draw inferences.

Speculation, in commerce, is the transaction of business upon principles of judgment drawn, not from the actual state of things, but that which is expected; as where a dealer sells at a lower price because he believes that price will fall still lower; or purchases at a high one, because he believes it will yet be higher; or, in general, where a dealer does any thing, the advantage of which is evident only from probable reasonings.

Speculum, in optics, a Latin word, signifying a mirror or looking-glass, and denoting any polished body answering that purpose.

Spermaceti, in pharmacy, the substance of the brain of a species of whale, now generally distinguished by the name of the spermaceti-whale. The flesh of an animal exposed in a running stream is found to change into a substance exactly resembling spermaceti.

Sphere, in geometry, that which is popularly called a globe. In a more general sense, a sphere is a solid contained under one uniform round surface, such as would be formed by the revolution of a circle about a diameter thereof, as an axis. All spheres are to one another as the cubes of their diameters. The surface of a sphere is equal to four times the area of one of its great circles, hence to find the superficies of any sphere, find the area of the great circle, and multiply it by four, which gives the superficies. The solidity of a sphere is equal to the surface multiplied into one third of the radius.

Sphere, in astronomy, that concave expanse, popularly called *heaven* and the *sky*, which surrounds the earth, and in which the sun, planets, and stars, appear to be fixed at an equal distance from the eye.

Sphere, in geography, a certain artificial disposition of circles transferred to the surface of the earth from the surface of the sphere of the heaven on which they are primarily supposed to be drawn. See Globe.

Sphere, *Armillary* (so called from the circles or rings of which it consists, likened to *armillæ* or bracelets), an astronomical instrument representing the several circles of the *sphere*.

Spherics, in geometry, the doctrine of the properties of the *sphere*, or solid so called.

Sphinx, in antiquity, an emblematical figure, composed of the head and breasts of a woman, the wings of a bird, the legs and claws of a lion, and the body of a dog; and said to have been the Egyptian symbol of theology. Its father was Typhon the gigantic son of Terra, and it was sent by Juno to afflict the Thebans, which it did by proposing dark enigmatical questions to passengers whom, if they could not solve them, it tore in pieces. The conclusion of its history is, that Œdipus having explained its famous riddle on man, it precipitated itself from a rock, and was dashed to pieces. The Egyptians and Romans placed sculptured sphinxes in the porches of their temples.

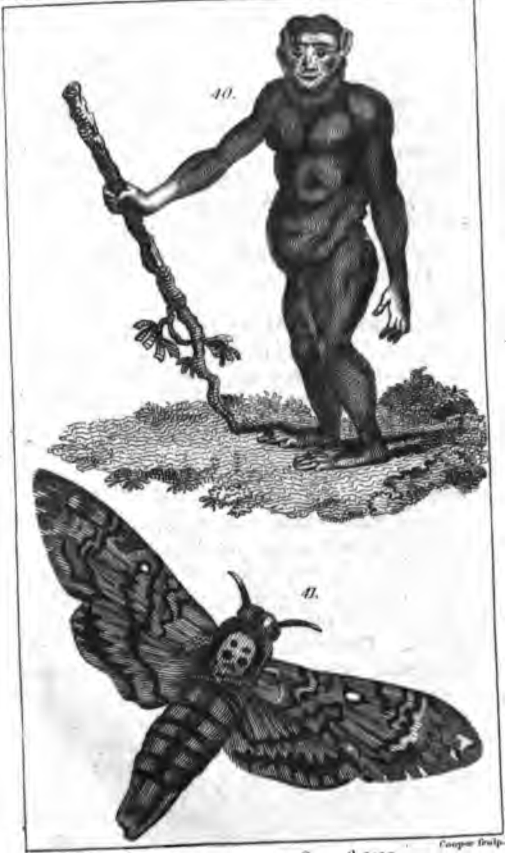
Sphinx, in natural history, *hawk-moth*, a genus of insects of the order Lepidoptera. There are said to be two hundred species of this genus. They fly abroad in the morning and evening, are very slow on the wing and often make a humming kind of noise: they extract the nectary of flowers with the tongue: the larva has sixteen feet, and is pretty active. The name of sphinx is applied to the genus on account of the posture assumed by the larvæ of several larger species, which are said to be seen in an attitude much resembling that of the Egyptian sphinx. The most beautiful of the European species is the Sphinx atropos. See Plate Nat. Hist. fig. 41. This insect when disturbed makes a noise like the squeaking of a mouse. In many parts of Europe it is held in dread by the vulgar, and regarded as the harbinger of misfortune. The caterpillar from which this sphinx proceeds, is in the highest degree beautiful, and surpasses in size every other European insect of the kind, being sometimes five inches in length: its colour is a bright yellow, the sides marked by a row of seven most elegant broad stripes, of a mixed violet and sky-colour. This caterpillar is found principally on the potatoe and the jasmine; it usually changes into a chrysalis in the month of September, retiring for that purpose pretty deep under the surface of the earth: the complete insect emerging in the following summer.

Spider, the English name of a genus of insects of which the species are exceedingly numerous.

Though among the creatures most harmless to man, and even highly beneficial, the figure and habit of the spider are such as to excite a general sensation of disgust: a sensation this, however, which, as in most similar cases, the habit of resistance soon overcomes.

The spider is chiefly celebrated for that beautiful structure, its web, by means of which it obtains its food. This product of insect-ingenuity is indeed admirable; and a remark, recently made public by a French gentleman, will recommend it to the farther notice of the curious:

"The spider," says Mr. Q. D'Isjonval, "is a more unerring indicator of impending changes in the atmosphere than the best barometer. These insects have two different ways of weaving their webs, by which we can know what weather we are to have. When the weather inclines to turn rainy or windy, they make the principal threads, which are the foundation, as it were, of their whole web, very short, and rather thick; whereas they spin them much longer, when fine and warm weather is to be expected. Thence it appears clearly, that the spiders have not only a near, but also a distant presentiment of the changes which are preparing in the air. The barometer foretels the state of the weather with certainty only for about twenty-four hours; whereas we may be sure that the weather will be fine twelve or fourteen days, when the spider makes the principal threads of its web long. It is obvious how important the consequences of this infallible indication of the state of the weather must be in many instances, particularly with regard to the operations of agriculture; for which



Cooper Sculp.

Fig. 40. **Simia** *satyrus*: *Orang-Outang*.
Fig. 41. **Sphinx** *atropos*: *hawk-moth*.

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reason it has frequently been lamented, that the best barometers, hydrometers, thermometers, and eudiometers, are principally in the hands of the consumers, and very rarely in those of the planters of the harvest. How fortunate is it therefore, that provident nature, among other gifts, also has bestowed upon the cultivator of the country such a cheap instrument, upon the sensibility and infallibility of which with regard to the impending changes in the atmosphere, he can rely! The barometers are frequently very fallible guides, particularly when they point to settled fair; whereas the work of the spider never fails to give the most certain information. This insect, which is one of the most economical of animals, does not go to work, nor expends such a great length of threads which it draws out of its body, before the most perfect equilibrium of all the constituent parts of the air indicates with certainty that this great expenditure will not be made in vain. Let the weather be ever so bad, we may conclude with certainty that it will not last long, and soon change for settled fair, when we see the spider repair the damages which his web has received.

In the year 1710, M. Bon, an ingenious naturalist, presented to the French academy and to the royal society of London, gloves and stockings manufactured from the silk of the spider; but it does not appear, even from the account of this gentleman himself, that it is possible to procure this silk with as much facility as that of the bombyx.

The silk of the spider is of two kinds: the first is weak, and only serves for that kind of web by which flies are entangled; the second is much stronger, and is that in which its eggs are wrapped.

M. Bon, after collecting 12 or 13 ounces of the egg-bags, had them well beaten for some time with the hand and with a stick, to get out all the dust: he then washed them in luke-warm water, till they left the water perfectly clean, and next boiled them, with the addition of soap, nitre, and gum arabic, over a gentle fire, for three hours. The soap being washed out, and the bags finally dried, he had them carded, by common silk-carders, but with cards remarkably fine.

By this process, a silk, of its natural ash-colour, was procured. It was easily spun; and the thread spun from it, according to M. Bon, was both stronger and finer than that obtained from the worm. M. Reaumur, however, affirms, that the natural silk of the spider is, on the contrary, five times weaker than that of the worm, calculating by the weights that each is capable of sustaining; and in the necessary operations of spinning five of these threads together, in order to make a thread as strong as common silk, it is impossible, however carefully it may be performed, that they should be applied so justly over one another as not to leave little vacant spaces between them, whence the light will not be reflected; and that, of consequence, the lustre of a thread thus compounded must fall short of that of a common thread. To this want of lustre, which was actually observed in the specimens presented as above related, the circumstance of tearing the silk, by carding, which cannot be dispensed with, also contributes.

As difficulties confessedly occur, it naturally becomes a question, why the silk of the spider should be desired while that of the bombyx can be had? M. Bon reckons on the superior hardiness of the spider; for that of 700 or 800 young spiders which he kept, scarcely 1 died in a year, while of 100 silk-worms, not 40 lived to make their bags. On the other hand, M. Reaumur objects, that the disposition of spiders to feed upon each other, must render the keeping them in large numbers wholly impracticable; having distributed 4000 or 5000 into cells (50 in some, 100 or 200 in others) the larger ones soon killed and ate the lesser, so that in a short time there were hardly left one or two in each cell.

With regard to *silk*, M. Bon reduced the whole genus of spiders into two species; those with long legs and those with short: the latter furnish the finest silk.

SPIKENARD ("pointed nard") a species of nard; a plant growing in India, which produces, even with the ground, and sometimes partly below it, a fruit in the form of a spike or ear, of about the length and thickness of a finger, covered with hairs of a reddish colour. It has a strong smell, and sharp bitterish taste, was formerly made into a highly valued ointment, and is at present considered as a strengthener of the stomach. The ancients mention another nardus, growing near the Ganges, of a poisonous smell. The spikenard is brought from the East-Indies, and therefore otherwise called *nardus indica*.

SPINAL MARROW, a continuation of the medulla oblonga; and as the spine is an assemblage or series of bones of the back, which support the rest of the body, so the spinal marrow is the origin of most of the nerves of the trunk of the body.

Spinet, a stringed, musical instrument, of the harp kind, and sometimes called a couched harp, as the harp is also called an inverted spinet. This instrument is played by two ranges of keys, the foremost range being in the order of the diatonic scale; and the other range set backward, in the order of the artificial notes or semi-tones.

The keys are long, flat slips of wood, that being pressed down at one end raise a jack at the other, which sound the strings by means of a crow-quill. The spinet takes its name from the quills, which are resembled to spinæ, "thorns."

Spinning, the act of reducing silk, flax, hemp, hair, wool, &c. into thread. It is performed on the wheel, or with a distaff and spindle, or with other machines proper for the several kinds of work. Hemp, flax, and other vegetable matters are to be wetted in spinning: silk, wools, &c. are spun dry: there is, however, a way of spinning or reeling silk, as it comes off the balls, where hot, and even boiling water is to be used.

Spinozism, the philosophy of Benedict Spinoza, who was born at Amsterdam, of Jewish parents. According to Spinoza, there is but one name for every thing existing, and that name is "matter.' The universe is one undivided substance, of which worlds, animals, and vegetables, are modalities or modifications, but not separate parts; and this one undivided substance is the Deity. The Deity performs all, rules all, is all.

Spinster, in law, an addition usually given to all unmarried women, below the daughters of earls.

Spirit, in physics and physiology, is defined by Newton to be a subtile, penetrating substance, which pervades all, even the densest, bodies, and lies hid therein. By the force and action of this spirit the particles of bodies attract each other, at very small distances, and when contiguous they cohere. By the same power, electrical bodies act at greater distances, both attracting and repelling the neighbouring corpuscles: light is emitted, reflected, and inflected, and warms bodies.

By vibrations of this *spirit*, propagated through the solid capillaments of the nerves, from the external organs of sense to the brain, and from the brain to the muscles, all sensation is excited, and the members of animals moved at the instance of the will.

Spirit, in metaphysics, an immaterial being; or, that which, beside matter, is conceived to exist: intellect: intelligence.

Spirit *of wine*, brandy rectified by repeated distillations.

Spirits, *animal*, in physiology, a fluid which, according to some, belongs to the animal economy, and performs the offices attributed by Newton, in a preceding article, to a spirit pervading all nature.

Spleen, in anatomy, a soft, spongy substance, situate between the false ribs and the stomach. Its ordinary length is six inches; its breadth three; and its thickness one.

Spondee, in the Latin and Greek prosody, a foot of verse, containing two long syllables; as vertunt.

Sponge, in botany, was thought to be a marine fungus, adhering to rocks, and other bodies beneath the water, and occasionally separated and thrown on the shores. Sponge is usually brought from the Mediterranean, and more especially from a particular island of that sea, called Nicaria, where the qualifications of a good diver for this plant are held in the highest estimation; but a finer sort is collected at Constantinople, and thence imported into Britain." The coarsest kinds come from the coasts of Barbary.

Sponge is now classed as a genus of the Vermes Zoophyta: the animal is fixed, torpid, and of various forms, composed either of reticulate fibres, or of masses of small spines, interwoven together, and cloathed with gelatinous flesh full of small mouths on its surface, by which it absorbs and rejects water. There are about sixty species. Spongia Officinalis is irregularly formed, porous, tough, lobed and woolly. It is found in the Mediterranean and in the Archipelago, also in the Indian seas, adhering to rocks by a broad base; it is often found inclosing small stones, shells, and particles of sand: marine animals pierce and gnaw it into irregular winding cavities, which appear on the outside by large holes higher than the rest: the internal part, when cut perpendicular, consists of small tubes, composed of reticulate fibres, and ending on the outside in an infinite number of small circular holes which are the bibulous mouths of the animal; each of which is surrounded by a few erect pointed fibres. This is the common spunge of the shops. The river sponge is green, erect, brittle, and irregularly disposed in numerous branches. It abounds in many parts of Europe, in the fresh water rivers of Russia and England, but particularly in the Thames. It scarcely exhibits any symptoms of life; is of a fishy smell: its pores or mouths, are sometimes filled with green gelatinous globules. The stinging sponge, if rubbed on the hand, will raise blisters, and if dried in an oven its power of stinging is much increased; it is found chiefly on the sea-coast of North America.

Sponge taken into the stomach swells, by imbibing the moisture, in such a manner as to stop the passage into the intestines, and thereby occasions certain death.

Spots, in astronomy, dark places observed on the sun, moon, and planets. The spots on the sun vary; while these on the moon and planets remain the same, and by their motion make the rotation of those bodies manifest. About forty-eight spots are counted on the moon, to each of which astronomers have given a name. They are supposed to be seas, lakes, morasses, and forests, which absorb the sun's rays, and therefore appear dark.

Spout-*Water*. See Water.

Spring, in natural history, an opening, or issue, of water from the earth.

The most satisfactory manner of accounting for springs and their attendant phenomena, is that of comparing the action of the water beneath the surface of the earth to that of a portion of the same water contained in a convenient vessel, and in the midst of which a little heap or island of the same earth is placed. In making such an experiment, it will be found that the water, obedient to the laws of attraction, will rise through the pores of the earth. In nature we have only farther to suppose reservoirs into which this filtrated water is collected; and from which the surcharge flows.

To fill these reservoirs, vapours, whether descending in mist, dews, or rains, and, probably, subterraneous communications with the sea, contribute.

Spring, in cosmography, one of the seasons of the year, commencing, in the northern parts of the world, on the day that the sun enters Aries, and ending when it leaves Gemini; or more strictly and generally, when the sun's meridian altitude from the zenith, being on the increasing hand, is at a medium between the greatest and the least.

Springs, *intermitting*: these may be explained on the principle of the syphon: they are streams that flow periodically. Let A, A, A, see Pl. Steam Engine, fig. 2, represent part of a hill within which there is a cavity D, filled by means of water draining through the pores of the hill: when the water rises to the level N D the vein A B C will be full, and the water will run through it as through a syphon, and will continue to flow till the cavity D C be empty, when it will cease to flow till it is again filled to the level N D, which may be many weeks or months, when the like phenomenon will occur.

Spruce-*beer*, a wholesome liquor, which is thus made: take 16 gallons of water, and boil half of it: let the other half be put cold into a barrel, and upon this pour the boiling water, then add 16lbs. of treacle or molasses, with a few table spoons-full of the essence of spruce, stirring the whole well together: add half a pint of yeast and keep it in a temperate heat, with the bung-hole open, for two days, till the fermentation is abated. Then bottle it and it will be fit for use in ten days or a fortnight.

Squadron, in the art of war, a division, which, among the ancients, was always square; whence its name.

"Squadron of horse," a body usually consisting of three troops, of 50 men each, and never of more than 200 men; because frequent obstacles would present themselves in posting a larger number to advantage.

A squadron is always drawn up three deep, or in three ranks, with the length of a horse between each. The standard is borne in the centre of the first rank.

"Squadron of ships," a division or part of a fleet, commanded by a vice or rear admiral, or a commodore. The number of ships is not fixed.

Squalus, the *shark*, in natural history, a genus of fishes of the order cartilaginei. The fishes of this genus are never found in rivers or lakes, inhabiting only the sea, and carrying terror and destruction wherever they appear. They occasionally emit a phosphoric illumination, visible by night. They are extremely rapacious of animal substances, and seize whatever they find with the most violent avidity. There are thirty four species. The S. carcharios, or white shark, is the most rapacious inhabitant of the ocean: its length is sometimes thirty feet. S. maximus, or barking shark, is often seen near the Hebrides in shoals of six or eight at a time. These are not fierce like the others: they subsist on sea-weeds: they are sometimes seen sporting about the billows with great agility and delight. See Plate Nat. Hist. fig. 42. S. Glaucus, or the blue shark, is the most elegantly shaped and coloured of all the species, is about ten feet long, and found in almost every sea. In the pilchard season it abounds on the coasts of Cornwall.

Stadtholder, the chief magistrate of the United Provinces, previous to the revolution, since which that state has re-assumed the name of Batavia, and constituted its republican form of government anew. See United *Provinces*.

The title of stadtholder is said to have been originally given to the officer who *held* the *stad*, *stede*, *stead*, or *place* of the counts of Holland. William I. prince of Orange, was stadtholder of Holland and Zeeland at the time the Dutch threw off the Spanish yoke, and contributed greatly to the accomplishment of that event.

In 1567, the states suppressed the office of stadtholder, and resolved that it should never more be erected; but in 1672, William III. subsequently king of England, was elected captain and admiral general, and, a few months afterward, the states revoked the edict of suppression, and declared him *hereditary* stadtholder.

The stadtholder enjoyed the command of the forces of the republic, by sea and by land. In Guelderland, Holland, and Utrecht, he participated in the sovereignty as president of the bodies of nobles of those states, and in Zeeland, as its only noble; and he had the right of assisting, though not of voting, at the deliberations of the states-general. In his executive capacity, he was the principal member of the council of state; and this body, in military affairs, was almost entirely under his direction. He was the chief of all courts of justice, and might preside in them when he pleased.

He had the prerogative of granting pardons to criminals. He had, by institution, the whole military patronage, with the exception of appointing general officers; and even these, by usage, received their communications from the states, at his nomination. He had the same power and influence in the navy; and he erected courts-martial, and presided in the different admiralties. He chose the magistrates of cities, from a double number of names presented by their councils, and could cashier them: and in Rotterdam, Dort, and other places, he had the same right of appointing the counsellors themselves, and the burghomasters. He was governor-general, and supreme director of the East and West India Companies; and possessed the power of nominating all the other directors, from a double number of candidates named by the company. Finally, he held the executive power; all things within the state were done in his name; and foreign nations treated with the republic in his person.

Stagonites, or Stalactites, in natural history, sparry projections, in the figure of icicles, which frequently ooze out of stone, on the roofs of caverns, and harden. See Spar.

Stamen, see Botany.

Standard, in war, a sort of banner, or flag, borne as a signal for the joining together of the several troops belonging to the same body: it is usually made of silk, on which are embroidered the arms, device, or cypher of the prince, colonel, &c. The standard is used for any martial ensign of horse, and is carried in the centre of the first rank. The royal standard is a flag in which the imperial ensigns of England, Scotland and Ireland are quartered, together with the armorial bearings of Hanover.

STANDARD, in commerce, the original weight, measure or coin committed to the keeping of a magistrate, or deposited in some public place, to regulate, adjust, and try weights used by particular persons in traffic. The standards of weights and measures in England, are appointed, by Magna Charta, to be kept in the Exchequer, by a special officer, called the clerk or comptroller of the market. The standard of gold coin is 22 parts of fine gold and 2 of alloy, in the pound troy. The pound is cut into 44 parts and a half, each of which is current for twenty-one shillings. The standard of silver is 11oz. 2 dwts. of pure silver and 18 dwts. of alloy of copper. Whether gold or silver be above or below the standard is found by assaying, and the hydrostatical balance.

STANNARIES, the mines and works from which tin is dug and purified. Those of this country are found chiefly in Devonshire and Cornwall.

STAPHYLINUS, in natural history, a genus of insects of the order coleoptera, of which there are said to be between two and three hundred species. The most remarkable as well as the largest of the British species is the S. major, which is an inch long, entirely of a deep colour, and when disturbed sets up the hinder part of its body as if in a posture of defence: it is seen in the autumn in the pathways of fields and gardens, is furnished with a large head, and very strong forcipated jaws. The insects of this whole tribe are extremely rapacious, devouring whatever insects they can catch, and frequently each other, most of them are found in damp places, among putrid substances: and a few upon flowers.

Staple, in commerce, signifies, primarily, a place of public sale, and even a town or city having such a place; and, secondarily, the principal goods brought to sale, or such as not being liable to perish, are particularly adapted to being brought to "the staple."

Star, in astronomy, a general name for all the heavenly bodies. "*Erratic or wandering stars*," those which, with regard to each other, change their places; the planets. See Planet.

Star, *falling*, a luminous meteor, darting rapidly through the air, and resembling the fall of a star: it is unquestionably an electrical phenomenon, and was never satisfactorily explained till the modern discoveries in electricity gave the solution.

Stars, *fixed*, those which are always at the same distances from each other. The principal points regarding the fixed stars, into which astronomy enquires, are 1. their distance, 2. magnitude, 3. number, 4. nature, and 5. motion.

1. The distances of the fixed stars are so vast as to outstep conception, and leave no means of calculation. That of Sirius, alone, has been attempted; and this, according to Flamstead, is thirty-five millions, four hundred and seventy-seven thousand, and sixty-four semi-diameters of the earth; and according to Huygens, nine hundred and fifty-one millions, five thousand, three hundred and twenty-eight semi-diameters. What the distances of the fixed stars are, therefore, has not been ascertained;

but it is demonstrable that they are prodigiously greater than that of Saturn.

2. The magnitudes of the stars appear to be very different; but this variation is attributed to that of their distances. They are distributed, however, by astronomers into seven several classes, called *magnitudes*. Those not reduced to classes, are called nebulous stars; being such as only appear faintly, in clusters, resembling little lucid *nebulæ*, or clouds.

3. The number of the fixed stars cannot be reckoned; Riccioli contents himself with affirming, that if a man should say that there are above twenty thousand times twenty thousand, he would say nothing improbable: yet it is conjectured that with the natural organs of vision, even a good eye never sees more than a thousand at the same time, on the clearest of nights. This latter remark, which appears so contradictory to experience, is justified by the argument that the twinkling confuses the sight; and the preceding, which goes so much beyond all that the telescope has yet enabled astronomers to note, on the ground that the instrument can scarcely be directed to any part of the heaven without discovering many, never before observed.—Thus, in the constellation of the Pleiades, instead of six seen by the best eye, Dr. Hook, with a telescope twelve feet long, counted seventy-eight; and with larger glasses, many more, of different magnitudes.—De Rheita saw 188 in the same constellation, and more than 2,000 in Orion. Huygens, looking at the star in the middle of Orion's sword, instead of one, found it to be twelve. Galileo found eighty in the same place. Flamstead's

catalogue makes the number of fixed stars, which he had observed, 3,000. One hundred and twenty-five years before the Christian æra, the number was made by Hipparchus 1022.

4. The nature of the fixed stars is argued from several premises. It is demonstrated that they are larger than the earth; that they are farther distant from the earth than the most distant of the planets; and being more distant, and yet more luminous than Saturn, it should follow that they shine with their own light: hence it is concluded, that the fixed stars are suns. It is farther supposed that they are not smaller than the sun of our own system, and that, like that, they are centres round which planets revolve; that is, that there are opake bodies upon which their light shines.

5. "*Motion of the stars.*" This is of two kinds; first an apparent motion round the earth, which is in reality that of the earth itself, and which revolution is performed in the space of 24 hours. This motion occasions the phenomena of the *rising* and *setting* of the stars; and is called the *first*, *common*, or *diurnal motion*; or *the motion of the primum mobile*, or *sphere*, or *firmament*.

The *second* or *proper motion*, is that whereby they go backward, from east to west, round the poles of the ecliptic, at the exceedingly slow rate of about 51 seconds a year. This is their *true motion*. They have probably another on their own axes, which cannot be discovered at this immense distance.

Some have taught, purely on the suggestion of their own imagination, that when the stars shall have accomplished their revolution, by arriving at those points in the ecliptic whence they first set out, nature will have finished the course assigned to it by the Creator, and stop like a watch till it be rewound up! The period during which the universe, according to this idle thought, is to last, from its commencement to its end, is variously estimated; that is, the estimation of the time in which the stars, at fifty-one seconds per year, will encompass the sphere, is various: according to Ptolemy, it is 30,000 years; Tycho Brahé makes it 25,816; Riccioli, 25,920, and Cassini, 24,800. See Sun.

Star-*chamber*, a chamber in Westminster, so called from its roof being ornamented with gilt stars. "*Court of star-chamber*," a court of equity in regard to criminal matters, abolished by act of parliament during the reign of Charles I. This court took upon itself to decide upon those cases of offence with regard to which the law was silent; and was in criminal matters what the exchequer is in civil. It passed judgment without the intervention of a jury. It differed from all other judiciary courts in this, that the latter were governed only by the common law, or immemorial custom, and acts of parliament; whereas the former often admitted for law the proclamations of the king in council.

The authority of the proclamations of the crown in creating laws, was long a point of contest. At present, the king's proclamation must be according to law; and the chancellor is to refuse the great seal if they are not. Should an illegal proclamation now be issued, the remedy would be to impeach the chancellor for affixing the seal, and the other ministers for acting upon its authority; and to prosecute or sue every inferior officer who should put its decrees into execution.

Starch, a glutinous substance, used to stiffen linen; and, when powdered, to ornament the hair. Starch is made by steeping wheat, or the refuse of wheat, in water; the floury viscous sediment being afterwards cleansed, and dried in an oven, or by the sun. The component parts of starch are oxygen, hydrogen, and carbon. Starch exists in a great number of vegetable substances, but chiefly in the roots and seeds, and particularly of those which are employed as food. The potatoe yields it in plenty. In nutritive grains it is perfect only when they have attained maturity.

Statics, a branch of mathematics, which enquires into the weight or gravity, and consequent motion of bodies. The science of statics comprehends 1. all the doctrines of the excitement and propagation of pressure, through the parts of solid bodies, by which the energies of machines are produced. 2. It comprehends every circumstance which influences the stability of heavy bodies; the investigation and properties of the centre of gravity, the theory of the construction of arches, vaults, and domes; the attitudes of animals, &c. 3. The strength of materials, and the principles of construction, so as to make the proper adjustment of strength and strain, in every part of a machine, edifice, or structure of any kind. Statics therefore furnishes us with what may be called the theory of carpentry, and teaches us how to construct roofs, floors, centres, &c. 4. Statics comprehends the whole doctrine of the pressure of fluids, whether liquid or aeriform, whether arising from their gravity, or from any external action. Hence we derive our knowledge of the stability of ships, or their power of maintaining themselves in a position nearly upright, in opposition to the action of the wind on their sails.

Stationary, in astronomy, signifies the appearance of a planet, when it seems to remain on the same point of the zodiac for several days. As the earth, from whence we behold the motions of the planets, is out of the centres of their orbits, the planets appear to proceed irregularly; being sometimes seen to go forwards, that is from west to east; sometimes to go backwards, or from east to west, which is called their retrograde motion. Now between these two states there must be an intermediate one in which the planet neither appears to go backwards nor forwards, but to stand still: this always happens when the line that joins the earth's and planet's centre is constantly directed to the same point in the heavens.

Statistics, a modern term adopted to express a more comprehensive view of the various particulars constituting the general and political strength and resources of a country, than was usually embraced by writers on political arithmetic. The principal objects of this science are the extent and population of a state, the occupation of the different classes of its inhabitants; the progress of agriculture, of manufactures, and of internal and foreign trade; the income and wealth of the inhabitants, and the proportion drawn from them for the public service by taxation, the condition of the poor; the state of schools, and other public institutions of utility; with every other subject, the knowledge of which tends to establish the true civil polity of the country, and consequently to promote its prosperity.

Statue, in sculpture, a human figure, represented in full relief. Strictly, a statue is a figure in an upright attitude. The first statues stood with their feet together, that is, without any appearance of motion.

An artist who makes statues or figures is sometimes called a statuary; the art itself is also called sculpture or statuary; and the marble fit for its purposes, statuary marble.

Statue, the height of a human creature, when standing. This seems to vary, according to climates and other circumstances, and without noticing accidents in the course of nature, from 4 to 7 feet. The males and females of the parts of the world hitherto familiar to history, are usually from 5 to 6 feet in height. The absurd idea that men were larger in ancient times than now, is amply contradicted not only by reasonings on the adaptation of man, at his present size, to all the other things of the world, but also by many relics of remote antiquity. The tomb of Cheops, in the oldest of the pyramids of Egypt, is only 6 feet and 488 parts in length, and would not do more than hold a modern coffin of ordinary dimensions. The tombs at Pisa afford the same data.

Steam engine: an engine for raising water or for producing any powerful effect in moving machinery, by the force of steam obtained from boiling water. This is unquestionably one of the most important machines that was ever invented: it has been employed in a thousand operations to which other powers would have been wholly unequal, and it may still be adapted to other purposes not yet thought on. The principle of this machine is this: there is a *forcing* PUMP (which see) with its rod fixed to one end of a lever, which is worked by the weight or pressure of the atmosphere upon a piston at the other end, a temporary vacuum being made below it, by suddenly condensing the steam, that had been let into the cylinder in which the said piston works, by means of a jet of cold water thrown into it. A partial vacuum being thus made, the weight of the atmosphere presses down the piston, and raises the other end of the lever with water, &c. from the mine. Then immediately a hole is uncovered in the bottom of the cylinder, by which a fresh supply of hot steam rushes in from the boiler, which acts as a counter balance for the atmosphere above the piston, and the weight of the pump-rods at the other end of the lever carries that end down, and of course raises the piston of the steam cylinder. The orifice for the emission of the steam is immediately shut, and the cock opened for injecting the cold water into the cylinder: this condenses it to water, and another vacuum is made below the piston, which is now again forced down by the weight of the atmosphere, and thus the work is continued so long as water and fuel are supplied.

The world is indebted chiefly to Mr. Watt for improvements in this important machine. By his contrivance it is said full three fourths of the fuel are saved in working the engine which were formerly used. He has contrived to obtain an uniform heat in the cylinder of his engines, by suffering no cold water to touch it, and by protecting it from the external air, or other cold bodies, by a surrounding case filled with steam, or with hot air, or water, or by coating it over with substances that conduct the heat very slowly. He makes his vacuum to approach nearly in excellence to that of the barometer, by condensing the steam in a separate vessel, called a condenser, which may be cooled at pleasure, without abstracting any of the heat of the cylinder either by an injection of cold water, or by surrounding the condenser with it. He extracts the injection water, and the detached air, from the cylinder, or condenser, by pumps which are worked by the engine itself. With these preliminary observations the reader will readily comprehend the several parts of the engine as is represented in the adjoining plate taken from the "Scientific Dialogues," a work that has gone through many editions, and is said to have done more than any other to inspire young persons with a taste for experimental and natural philosophy. The boiler A (Plate STEAM *Engine*) is about half full of water, and standing over a large fire, B is the pipe to convey the steam from the boiler to the cylinder C, in which the piston works up and down, *a* and *c* are steam valves by which the steam enters the cylinder; it is admitted through *a* when it is to force the piston downwards, and through *c* when it presses it upwards: the eduction valves are shewn at *b* and *d*: through these the steam passes from the cylinder into the condenser *e*, which is a separate vessel placed in a cistern of cold water, and which has a jet of cold water continually playing up in the inside of it. F *f* is the air pump and rod which extracts the air and the water from the condenser: this is worked by the lever R S; and the water taken from the condenser, and thrown into the hot well *g* through the pipe *n*, is thrown up again by means of the pump at *y*, and carried back into the boiler by the pipe *i i*. Another pump is shewn at *k* which is likewise worked by the engine itself; this supplies the cistern in which the condenser is fixed, with water from the well. All the pumps, viz. that at *k* which brings the cold water from the well to supply the condenser; that shewn at E F *f* which throws the water from the condenser into the hot-well *g*, and the one at *y* which conveys the water from the hot-well to the boiler, are worked by the same beam R S, which also is attached to, and moves the piston C.

The valves at *a*, *b*, *c*, *d* are opened and shut by means of the levers shewn at *o* and *p* which levers are worked by the piston-rod E F. Motion is given to the whole by the fly-wheel x, on the axis of which is a small concentric toothed wheel H: a similar wheel I is fastened to the rod T, and not turning on its axis, rises and falls with the motion of the great beam. The centres of the two small wheels are connected by a bar of iron, when therefore the beam R S raises the wheel I, it turns round the wheel H, and with it the fly-wheel *x*, which will make two revolutions while the wheel I goes round it once.

Suppose the piston at the top of the cylinder, and the lower part of the cylinder filled with steam. By means of the pump-rod E F, the steam valve *a*, and eduction valve *d* will be opened together, the branches from which being connected at *o*. There being now a communication at *d* between the cylinder and condenser, the steam is forced from the former into the latter, leaving the lower part of the cylinder empty, while the steam from the boiler entering by the valve *a*, presses upon the piston, and forces it down. As soon as the piston has arrived at the bottom, the steam valve *c* and the eduction valve *b* are opened, while those at *a* and *d* are shut: the steam, therefore, immediately rushes through the eduction valve *b* into the condenser, while the piston is forced up again by the steam, which is now admitted by the valve *c*.

It remains now to explain some apparatus connected with the boiler. The water is brought into the boiler by means of the pipe *g*, which is bent at the lower end to prevent the steam from ascending in it; *m* is a stone nicely balanced on the lever 2, 2, connected with a valve at V, which admits the water in proper quantities: for by a principle in hydrostatics the stone *m* is partly supported by the water; if then by increasing the fire, too great an evaporation take place, the water in the boiler sinks below the proper level, the stone must also sink, which will cause the valve to open wider, and let that from the cistern come in faster. If on the other hand the evaporation be less than it ought to be, the water will have a tendency to rise in the boiler, and with that, the stone must rise, and the valve will, consequently, let the water in with less velocity. By this contrivance the water in the boiler is always kept at one level. The little pipe *t* does not reach the water in the boiler, and the pipe *u* goes just below its surface; if the water in the boiler be at its proper height, and the two cocks be opened, steam will issue from the former, and water from the latter: but if the water be too high it will rush out at *t* instead of steam, and if it be lower than it ought to be, then steam will issue out of the pipe *u* instead of water.

Steel, iron mixed with other ingredients, and purified by fire; from which process it is whiter and of a finer grain than before. Iron, on being made into steel, becomes harder than any other metal. It is tempered, or hardened, by plunging it, when hot, into cold water. If heated, and not subsequently plunged into water, it remains soft. Steel was formerly understood to be composed of iron, mixed with any stone that melted with readiness. It is now defined to be iron combined with carbon. According to the analysis of Vaugelin, however, it still appears, that it contains a proportion of stony particles. This chemist found the composition of one kind of steel to consist of carbon, silica, phosphorus, iron, and in three others, these four substances were always present, and in relative quantities nearly similar. It is not, however, concluded that phosphorus and silica are essential to the nature of steel.

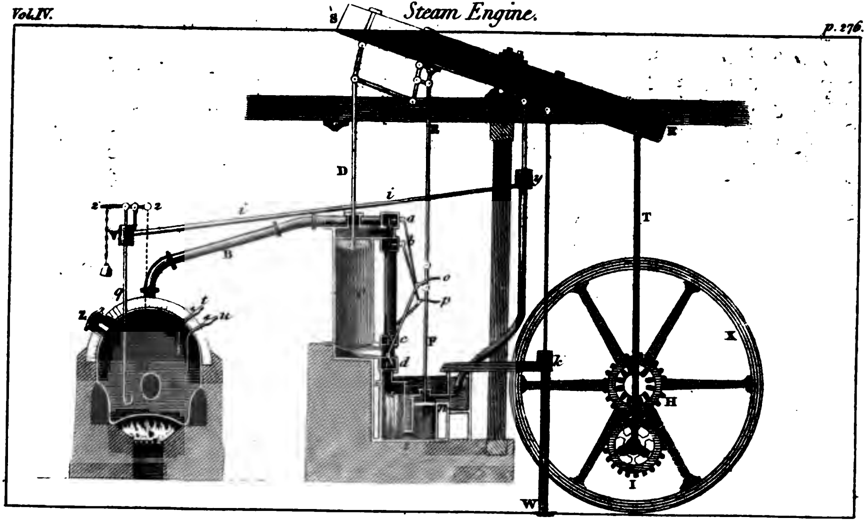
Plumbago, or black lead, is a native mixture of iron and carbon, as *steel* is an artificial one; but the proportions are widely different. See Carbon, Diamond.

Steelyard, or *Roman balance*, in mechanics, a balance by which the gravities of different bodies are found, with the assistance of a single weight.

Stere, a Greek word implying solidity; in the new metrical system of France, it is a cubic metre.

Stereography, the drawing of solids, the art of drawing the figures of the solids upon a plane.

Steam Engine.



Cooper sculp.

Stereometry, that part of geometry which teaches how to measure solid bodies; that is, to find their solid contents; as the contents of the trunk of a tree, or of a vessel of capacity.

Stereotypes, in letter-press printing, fixed types. Instead of moveable types, which permit the pages of a book to be taken to pieces when the impressions are made, it has been contrived to fix them, so that, when once set, they remain, like copper-plates, for all future occasions. This is done in two ways; either what is technically called the *form*, (that is, the letters of a certain number of pages) are cast in one solid body of metal; or, the types being composed, as usual, they are cemented together.

The objects of this invention, which is at present carried into execution by Didot of Paris, and Wilson in London, are two: the one extreme correctness, and the other an economy which may render the books so printed purchasable at a rate comparatively cheap. The first is attained by avoiding those accidents which frequently render letter-press imperfect, even after every attention to its correctness has been paid; as the falling out of types, and their being misplaced by those who restore them; and farther by securing to all future editions, the advantages thus laboriously accomplished in the first. The second, that of economy, is promoted by the success of the first; for the expenditure necessary on one edition, answers for all the rest: but, as in this plan, the first edition is much more costly than in the ordinary method, this invention, applied to books that may never be printed a second time, or which, if repeatedly printed, may be as repeatedly altered, is the reverse of frugal. The stereotypes are only proper, therefore, for works, the reputation of which is established, and whose authors are dead; as the Iliad, Eneid, or Spectator.

STERLING, in English commerce, a term which is applied to money, and signifies that it is of the fixed, or standard, national value; thus "a pound sterling" is not indefinitely "a pound," but "an English pound."

Camden appears to offer the true etymology of this word, when he derives it from *easterling*, and corroborates, if not demonstrates, the propriety of this suggestion, by quoting old deeds, where *English* coin is always called *nummi easterlingi*. In explanation, he observes, that in the reign of Richard I. money coined in the eastern part of Germany grew to be much esteemed in England, on account of its purity: this money was called *easterling* money, as all the people of those parts were called easterlings; and in consequence of the partiality related, some of the *easterling* coiners were invited into this kingdom, to perfect its coinage, which was thence forward denominated *easterling*, *esterling*, or *sterling*. During a considerable period, the only coin in England was one of about the value of a penny: whence it happens, that many ancient writers use the word *easterling* as a substantive; and synonymously with *penny*.

Steward, Lord, High of England, in English polity, an office hereditary in the family of Lancaster, till its accession to the crown, in the person of Henry IV. since which, it has never been confided but *(pro hac vice)* for a specific occasion; as, on the trial of a peer, when no parliament is sitting. The ancient stewards of England were empowered to supervise the whole kingdom, both under and after the king: they shared, therefore, with the crown, the functions of government.

STEWARD *of a ship*, an officer who receives, keeps, and distributes the victuals.

STEELYARD, in the history of London, a place near London-bridge, where much steel was once sold.

"Company of the Steelyard," a corporation of foreign merchants, established at London; and thus denominated from the Steelyard, the place of residence, assigned them by act of parliament. This company was erected in 1215, under Henry III. in favour of the free cities of Germany, which had assisted the king in his wars with France. It was greatly prejudicial to the native traders of the kingdom, and therefore abolished by Edward VI.

STOICISM, in the history of philosophy, the system of Zeno. See PHILOSOPHY, *Stoical*.

STOCKING, in European costume, a part of clothing which covers the leg and foot. Stockings are, at present, either wove or knit; but anciently, they were made of cloth, and sewed. Wove stockings are worked on an exceedingly complex loom, of polished iron. This machine is said to have been brought into England, by a Frenchman, its inventor. When there, it was forbidden on pain of death to carry any copy of it out of the country, or communicate its construction to foreigners; but another Frenchman, after examining it, went to France, in 1656, and constructed a similar loom, wholly by the power of his memory.

STOCK, is a general name for the capitals of our trading companies. It is a word also that signifies any sum of money which has been lent to government, on condition of receiving a certain interest till the money is repaid. Hence the price of stocks, or rates per cent, are the several sums for which 100*l.* of those respective stocks sell at any given time. Thus if I want to purchase 100*l.* stock in what is denominated the 3 per cent. Consolidated Annuities, I must pay perhaps 63*l.* or 64*l.* or 70*l.* according as the market price may be. This price is perpetually varying, particularly in time of war: the editor of this work has known it as low as 48 and as high as 97, the latter price was in the year 1792, the former during the war, which commenced in 1793. For the sake of the juvenile reader the following table taken from the newspaper called the "Times," of the 14th of June 1811, shall be explained,

PRICE OF STOCKS.

Bank Stock, 240.
3 per Cent. Red. Ann. 63 ⅞ a [illegible]
3 per Cent. Con. Ann. shut.
4 per Cents. 80 ½ a 79 ⅞
5 per Cent. Navy shut.
Long Ann. 16⅞
India Bonds, 17*s.* a 18*s.* pr.
Exchequer Bills, 1*s.* pr.
Omnium, par, a ¼ dis.
Consuls for Acc. 64 ¾ ½.

To purchase on this day, 100*l.* Bank-Stock, 240*l.* must have been paid: this usually brings 10 or 11*l.* per cent. per ann. In the 3 per cent. Reduced Annuities, 100*l.* which produces 3*l.* per ann. might have been purchased in one part of the day for 63⅜ or 63*l.* 7*s.* 6*d.*, and in another part of the day for

63⅛ or 63*l.* 2*s.* 6*d.* In the 4 per cents. the price fluctuated from 80*l.* 2*s.* 6*d.* to 79*l.* 17*s.* 6*d.* The 3 per cent. Consols, and the 5 per cent. Navy were shut, that is, no transactions can be done in them, the accounts being adjusting in order to settle the half yearly dividend, which is payable about a fortnight after Midsummer day. The Long Annuities were worth 16⅞ years purchase; that is, if I wished to purchase 10*l.* a year in that stock, the interest of which is terminable in about 50 years, I must pay for it 168*l.* 15*s.* This will entitle me or my assigns to 10*l.* a year during that period, unless in the interval, I sell it to some other person.

India Bonds, 17*s.* to 18*s.* premium, that is, if I wish to purchase an India-bond, value 100*l.* I must pay 17*s.* or 18*s.* more than the 100*l.* for it. Whereas an Exchequer Bill of the same amount might be purchased for 1*s.* above the 100*l.* that is 1*s.* premium.

"Omnium" is a term used to denote the several stocks in which the last loan was made: and the ¼ per cent. discount, shews that a person might purchase 100*l.* of that loan, that is 100*l.* in the several stocks in which it was contracted for, at ¼ of a pound or 5*s.* less than the original price.

"Consols for Account 64¾ a ½," shews that bargains had been made for this particular stock, which were to be made good at the opening of the stocks at the price of 64*l.* 15*s.* or 64*l.* 10*s.* for every 100*l.* stock, which 100*l.* will produce 3*l.* per ann.

STOLE, in costume, a long robe, or vestment; or, clothing in general.

"Groom of the Stole," in the royal household of Great-Britain, an officer whose nominal duty it is to superintend the king's wardrobe.

Stone, in mensuration, a quantity or weight, used in measuring various commodities, and of which the amount itself is various.

A stone	lb.	A stone	lb.
of beef in London, is	8	of wool, by statute,	14
in Herefordshire	12	in Herefordshire	12
in the North	16	in Gloucestershire	15
of glass	5	among horse-racers	14
of wax	8		

Stone-*lime*, a stone of a coarse grain, which, being first burnt in a kiln, is made an ingredient in mortar and plaster. There are two kinds of lime in common use in England; the one hard, and the other soft and chalky. See Lime.

Stone-henge, in English geography, the remains of a public structure of the ancient Britons, still extant upon Salisbury-plain. It consists of many unhewn stones, which, with some that are wanting, appear to have originally composed four ranks, one within another. Some of them, especially in the outermost and the third ranks, are twenty feet high, and seven broad. The vertical stones sustain horizontal ones, laid across their heads, and fastened by mortises. The whole is supposed to have been once joined together.

The purpose of a place of this description, among the generations which, two thousand years ago, peopled the island of Britain, and were not so barbarous or inconsiderable as is commonly supposed, and as the vanity and superior refinement of the Romans contribute to represent, seems to have been of holding public meetings. Of the nature of these meetings, some idea will be formed from an extract under the article DRUID.

STORAX, see STYRAX.

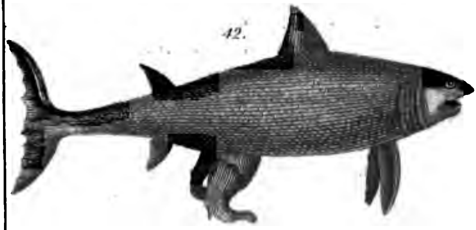
STREIGHT, STRAIGHT, or STRAIT, in geography, a narrow pass of the ocean, through which the water flows from one sea to another. The streight of Gibraltar is about 130 miles long and 12 broad, joining the Mediterranean sea with the Atlantic ocean. The streight which in a similar manner joins the Baltic with the Atlantic, is called the Sound; and that between Britain and France, the English Channel, or Pas de Calais.

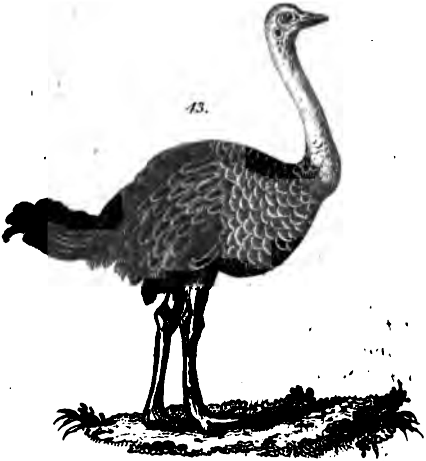
STRATUM, in geology, a bed or layer of fossil matter. On digging below the earth, to almost the least depth, it is found that wherever it has not been disturbed before, the laws of nature have composed it, not of an homogeneous or similar mass, but of strata, layers, or stripes of different materials. The arrangement and nature of these materials are in the most extreme degree irregular. In some places, the strata are shallow and of numerous kinds; in others, deep, and of but two or three kinds. In some instances also, the light lie upon the heavy; and in others, the heavy upon the light.

STRIX, in natural history, the owl, a genus of birds of the order accipitres. The birds of this genus are rapacious: they seldom are seen in the day, secluding themselves in the hollows of trees, and buildings, being unable from the particular structure of the eye to endure the glare of sunshine. When they do appear in the day, they are pursued and persecuted by a variety of small birds, who combine in their expressions of ridicule and aversion, and soon oblige them to recur again to their retreat. During the season of general repose, they are active in the quest of food, which in darkness they perceive with facility, and disturb the silence of night by loud screams. Their usual prey consists of bats, mice, and small birds.

Struthio, the ostrich, in natural history, a genus of birds of the order Gallinæ. There are four species. S. camelus, or the black ostrich, is about eight feet long, and when quite erect it measures likewise seven or eight feet. It is chiefly found in Africa; and near the Cape of Good Hope, it is very abundant. It is said that the ostrich will carry a man upon its back, and when unincumbered by any burden, its speed is truly extraordinary, and will exceed the rapidity of a common horse. Ostrich's feathers form an admirable ornament for the ladies; their skins are manufactured for the purposes of leather. Their eggs constitute an excellent repast, one is said to be sufficient for three or four moderate persons. See Plate Nat. Hist. fig. 43.

Style, in literature, a term taken, by metaphor, from the stylus or antique pen, to signify the writing. Thus we say, the style of Robertson, in the same sense as the pencil or hand of Guido, meaning in both cases the manner, and applying the name of the instrument to the work. Style, then, is the manner in which a person expresses himself in writing. Style, in criticism, is above syntax; inasmuch as syntax requires only rectitude, while style demands both rectitude and grace. Language may be faultless as to syntax and yet bad





Cooper Sculp.

Fig. 42. Squalus *cinereus: basking shark.*
Fig. 43. Struthio *camelus: black ostrich.*

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as to style. Syntax is grammatical law; style is wholly under the sway of the imagination: hence in one language there can be one syntax only; but a thousand styles, and all equally good. Syntax may be taught by rules, but style must be the gift of nature, assisted by observation; it depends upon the habitual character of the writer, or the temporary one with which he is possessed by a particular subject.

Style is the manner of saying a thing: and of this, the first merits are, that it be appropriate to the thing, and to the occasion of and on which it is said: now, nothing but a vitiated taste can lead men to err in these particulars; nature gives to every one the mode of expression proper to all situations; and hence it is that the natural style, after all, is the name which we must give to the best.

Imitation is the rock upon which the larger part of adventurers for praise are wrecked. They would write like Shakespeare, or Johnson, or Sterne; but they seem to forget that the first step is to think and feel like Shakespeare, or Johnson, or Sterne. Never yet was there a man, both clear in his ideas, and vivid in his feelings, that incurred censure for deficience in his style.

Style, see **Botany**.

Style, see **Chronology**.

Stylet or **styletto**, a small poinard that may be concealed in the hand. The blade is usually triangular, and so slender that the wound it make is scarcely perceptible.

Stylites, christian anchorets, who spent their lives on the tops of columns, for the sake of perfect abstraction and meditation. The founder of this order was St. Simeon, sur-named *Stylites*, who, in the 5th century, took up his abode on a column. The first he used was six cubits high; the second twelve; the third twenty-two; and the last, on which he lived several years, thirty-six. The tops of these columns were three feet in diameter, and guarded by a ledge or rail that reached almost to the girdle, in the manner of a pulpit. It was not possible to lie down on them. Stylitism lasted among the christians till the 11th century; and a similar practice is still resorted to by the hindû fakirs.

Styrax, storax, a genus in botany, of which there are four species. The most remarkable of these, is the styrax benzoin, or gum benjamin tree, as it is corruptly called. This is of quick growth, rising to a considerable height: it is a native of Sumatra, and at the age of six years it affords the benzoin; the bark is then cut through longitudinally, at the beginning of the principal lower branches, from which the drug exudes in a liquid state, and by exposure to the sun and air it soon concretes, after which it is scraped off with a knife or chissel. In Arabia, Persia, and other parts of the east, benzoin is consumed in perfuming the temples, and also in destroying insects.

Subaltern, in military economy, an officer who is subject to the direction of another. It generally implies a serjeant or corporal.

Subduplicate *ratio*, of any two quantities, is the ratio of their square roots. This is opposite to the duplicate which is the ratio of the squares: thus if the quantities be a and b, the duplicate ratio is $a^2 : b^2$ and the subduplicate ratio is $\sqrt{a} : \sqrt{b}$.

SUBJUNCTIVE, in grammar, a mode or mood of the conjugation of verbs, in the Greek and some other languages; and thus called because it is usually *subjoined* to and dependent on another verb. It mentions a thing *conditionally* or by way of *supposition*; and is denoted in the English language by the addition of *if*, *though*, or some other preposition, expressed or understood; as, "Were I in Spain," or "*If* I were in Spain; and,

"*Though* neither blossoms on the fig appear,
"Nor vines with clusters deck the circling year;
"*Though* all our labours olive-trees belie;
"*Though* fields the substance of the bread deny;
"*Though* flocks are sever'd from the silent fold,
"And the rais'd stalls no lowing cattle hold;
"Yet shall my soul be glad, in God rejoice;
"Yet to my Saviour will I lift my voice!"

The *subjunctive* mood also distinguishes itself in the English language, by occasionally assuming in the singular persons, the form of the plural. Thus it is said, "*Were* I gone,"—"*Were* you gone,"—"*Were* he gone," as well as "Were *they* gone." With regard to the plural the rule is: employ *you* in a collective sense, and *ye* when the objects are to be severalized; as,

"To you, ye gods, I make my last appeal!"

Here, the speaker first addresses the gods as *one* body, and secondly as *many* individuals.

SUBLIMATION, in chemistry, a process by which certain volatile substances are raised by heat, and again condensed by cold into a solid form. Thus sulphur exposed to heat in close vessels is volatilized or sublimed in the form of very white powder, known by the name of flowers of sulphur. Soot in the chimney is a sublimation of coal: benzoin gives a most beautiful substance by sublimation; it appears in abundance of silvery flakes.

Sublapsarian, and **supralapsarian**, names of subsects of Christians among the followers of Calvin. 'The *supralapsarian* and *sublapsarian* schemes,' says Doddridge, 'agree in asserting the doctrine of predestination; but with this difference, that the former supposes that God intended to glorify his justice in the condemnation of some, as well as his mercy in the salvation of others, and for that purpose decreed that Adam should necessarily fall, and by that fall bring himself and all his offspring into a state of everlasting condemnation: *the latter*, that the decree of predestination regards man as fallen by an abuse of that freedom which Adam had, into a state in which all were to be left to necessary and unavoidable ruin, who were not exempted from it by predestination.'

Sublime, in literature, that stile or manner of writing in which a sublime thought, or a fact sublime in its character, is suitably presented to the mind. The principal character of the *sublime* style, is its freedom from incumbrances, that, by distracting the attention, weakens the impression which the subject would otherwise make. Hence it is always brief: it never enters into particulars. A fact is a great object; particulars are small ones. The language of men of great but uncultivated talents is *sublime*; that of refined genius correct. When men grow philosophical, they can seldom excel in the *sublime*. The sources of the *sublime* in language are well enumerated by Longinus. The first is elevation of mind; the second, ardent sensibility; the third, the proper use of figures; the fourth, grandeur of diction; and the fifth, a dignified harmony of arrangement.

The *sublime* in narration is exemplified in the well-known commencement of the book of Genesis: 'God said, let there be light, and there was light.'

The *sublime* in thought and diction has been thought manifest in the apostrophe of Saurin to Lewis XIV.

'And you, dreadful prince! whom I once honoured as my king, and whom I yet respect as a scourge in the hand of Almighty God, you also shall have a part in my good wishes! The provinces which you threaten, but which the arm of the Lord protects; this country, which you fill with fugitives, but with fugitives exulting in love; these walls which contain a thousand martyrs of your making, but whom religion renders victorious; all these yet resound benedictions in your favour. God grant the fatal bandage that hides the truth from your eyes may fall off! May God forget the rivers of blood with which you have deluged the earth, and which your reign has caused to be shed! May God blot out of his book the injuries which you have done us; and, while he rewards the sufferers, may he pardon you, who caused us to suffer! O may God, who hath made you to us, and to the whole church, a minister of his judgment, make you a dispenser of his favours, and administrator of his mercy!'

Subornation, a secret preparation, or instruction, of a witness, alluring or disposing him to perjury; or the production of a witness wholly false.

Subpoena, in law, a writ which, "sub pœnâ centum librarum," under the penalty of an hundred pounds, commands appearance in the court of chancery, in cases where the common-law has made no provision. Peers are summoned without writs, the chancellor requiring their attendance by letter.

Subscription, in ecclesiastical affairs, the signing or affixing the name of the subscriber to a confession or statement of faith, as a pledge of attachment. This is required by the Church of England of all who apply to it for holy orders; and the statement is called the *XXXIX articles*, as being set forth under that number of heads. Some dissenters too from the Church of England, to their disgrace, are also attentive to subscriptions of this nature. Their ministers, on receiving assistance from their pecuniary funds, are required to give in a regular and explicit confession of their faith. The following more general declaration, is to be signed by those who receive certain gifts devised by the will of an opulent dissenter:

'I —— of ——, do hereby declare, that I am a minister, teacher, and preacher of the gospel; that I am not a Unitarian, Arian, Socinian, or Arminian; but that I am of Calvinistic principles, of the —— denomination; and that I do not usually administer or receive the ordinance of the Lord's Supper, commonly called the Sacrament, kneeling; nor have done so for the last six months.' An attempt is now making to put an end to this disgraceful test.

Subscription, in English commerce, the share which an individual takes in a public stock or trading company, by writing his name, and the share he requires, in the book or register of the concern.

Subsidy, in British politics, a sum of money raised by authority of parliament, by impost on the people, and given to the crown for supporting the expences of government; and which is also called a supply: or a sum of money given by the government of one nation to that of another, for the immediate purpose of serving the latter, and the ultimate one, of benefiting the former.

Substantive, in grammar, a noun or name, denoting a thing without any regard to its qualities; as, on the other hand, an adjective is the name of a quality. Thus of the words "red house," the first denotes a quality, and is therefore an adjective; the second a thing, and is therefore a substantive. It often happens, however, that the name of a quality is used to express the thing or things possessing that quality, in which case it becomes a substantive; as "The race is not to the swift, nor the battle to the strong." It is no matter what a word ordinarily means: whenever it denotes a thing, it is a substantive. If we look to the etymons of the names of things, we shall find most of them to be the names of qualities; that is, the generality of things have received their proper or peculiar names from some distinguishing quality. Thus the proper names Phœbe, Paul, Luke, Francis, Gregory, severally denote the qualities shining, little, luminous, free, and watchful; and succinum, the proper name of a certain thing, is so used because it is the name of the quality, yellow, or white.

Succession, in astronomy, is spoken of the order in which the signs of the zodiac follow each other, and in which the sun appears to pass through them. This order is expressed in the two following technical verses:

Sunt Aries, Taurus, Gemini, Cancer, Leo, Virgo;
Libraque, Scorpius, Arcitenens, Caper, Amphora, Pisces.

Succinum, the Latin name for amber, or electrum. See Amber and Electricity.

Suction, the act of sucking or drawing up a fluid by means of the mouth and lungs. There are many effects vulgarly attributed to suction, which, in reality, have very different causes: as when a person sucks any liquor through a pipe, it is commonly thought that by this action the person draws the air up into his mouth, and that the water which is contiguous to it, follows it by a kind of attraction, as if the air and water hung together, whereas the phenomenon is produced merely by taking away the weight or pressure of the air from the surface of the liquid in the pipe, and the pressure of the air on the liquid on the outside of the pipe forces it up into the pipe, to produce an equilibrium.

Suffragan, in church polity, a term of relation applied to a bishop, with respect to the archbishop who is his superior.

The archbishop of Canterbury has 21 suffragans, and the archbishop of York, 4.

Sugar, in commerce, the juice of a kind of cane, growing in the East and West Indies.

I. The sugar-cane, which resembles the reeds common in morasses, except that its skin is soft and its pulp a spongeous substance, usually grows to the height of about five or six feet, with a diameter of half an inch. It is divided by knots, at the distance of eighteen inches from each other. At its top, it protrudes several long, green leaves; and in the centre of these, is its flower. When the leaves springing from the knots decay, the plant is ripe, and this usually at 10, but sometimes, 15 months growth. It is now cut, stripped of its leaves, and carried to the mills.

The mills consist of three wooden rollers, covered with steel plates; and are kept in motion by water, wind, cattle, or slaves.

II. The juice pressed from the canes passes through a duct into the sugar-house, where it falls into a vessel by which it is conveyed into the first boiler. Here it is simmered over a slow fire, and mixed with potash and quick lime; and by the action of the heat, and the assistance of these ingredients, its unctuous parts are raised to its surface, in the form of a thick scum, which is carefully removed. In a second boiler, over a stronger fire, it is made to boil, and its purification continued, by means of a fresh lye. After passing through three other boilers it arrives at the sixth, diminished in quantity, to the degree of two-thirds, and in the state of a syrup. In the sixth boiler, it is finally purified and thickened. It is now put into a cooler; where, after stirring it briskly together, it is left to settle, till a crust of the thickness of a crown-piece is formed on its surface, when it is stirred again, and put into vessels in which it stands till fit to barrel. By analysis, sugar is found to contain oxygen, carbon, and hydrogen.

III. The preparations of sugar made in the West Indies, are of nine descriptions:

1. Crude or muscavado; 2. strained or brown; 3. earthed or white, in powder; 4. refined, either in powder or loaves; 5. royal; 6. candied; 7. of fine syrup; 8. of coarse syrup; 9. of scum.

1. Crude, or muscavado sugar, that first prepared from the cane, as above. 2. Strained or brown sugar, is, in point of quality, between the crude sugar and the earthed. Its preparation is similar to that of the former, with the addition of straining it through flannels. 3. Earthed sugar, is prepared, through the whole process from the cane, with peculiar nicety, and laded from the sixth boiler into conical earthen forms or moulds, the points of which are perforated, but plugged with linen. Five or six hundred forms are placed in a stove, and the tops of the sugar covered with a fine earth, by which it is filtrated and whitened. When after this operation the sugar is thoroughly dry, it is reduced to powder, and barreled. 4. Refined sugar, is made of crude sugar, strained sugar, and the head of loaves that have not whitened well. These ingredients are boiled, clarified with eggs, and strained. 5. Royal sugar is prepared by melting the purest refined sugar in a weak lime-water, with the occasional addition of allum, clarifying it three times, and straining it as often, through a coarse cloth. When finished, it is as white as snow, and so transparent, that a finger touching it, is seen through the thickest part of the

loaf. 6. Candied sugar, or sugar purified and crystalized. This, in the West-Indies, is made by dissolving earthed sugar in weak lime-water; clarifying, scumming, straining, and boiling it; and put into forms crossed with little rods or strings, to receive it as it crystallizes; the forms are suspended in stoves, which are shut up, and the fire made very vehement, and by this process, the sugar is raised to fly into crystals. Red sugar-candy is tinctured with juice of the Indian fig. White sugar-candy, is made with white sugar, in brass peels or vessels. 7. Sugar of fine syrup or treacle, is made from the syrup which runs from the forms, after the earth has been applied. 8. Sugar of coarse syrup, or treacle, that made from the syrup which runs from the forms after the linen plugs are taken out; and also from that still coarser, which runs from the barrels of raw sugar, and which was formerly only used for rum. 9. Sugar of the scum, that made from the scum of the two last coppers. Barley-sugar, sugar boiled to brittleness, and then cast on a stone, anointed with oil of sweet almonds, and formed into twisted sticks.

It should be boiled in a decoction of barley, whence its name; but, for the sake of transparency, plain water is usually substituted. To give it the brighter amber colour, saffron is sometimes used.

SUGAR or *salt of lead*, or *saturn*, an essential salt of vinegar, incorporated with the substance of ceruss or lead, dissolved in vinegar: ceruss is also called white-lead.

SUIT OF COURT, or SUIT OF SERVICE, in law, an attendance which a tenant owes to the court of his lord.

Sukotyro, in natural history, a genus of the class Mammalia; of the order Bruta. It is characterised by a horn on each side near the eyes. The only species is the sukotyro indicus, which is represented to be equal in size to an ox, and possessing the snout of a hog; with ears differently placed from those of other animals, it has a bushy tail, eyes upright in the head, and next to these having on each side a horn or tusk approaching in size to that of an elephant. It is said to be a native of Java. See Plate Nat. Hist. fig. 44.

Sulphates, **Sulphites**, See **Sulphur**.

Sulphur, in chemistry, a substance which, never having been decomposed, is considered as a simple or primary body, and as such ranks among the simple combustibles. Sulphur is hard, brittle, and usually of a yellow colour, without any smell, and of a weak, though perceptible taste. It is dug out of the earth in various places; particularly Italy, Switzerland, and South America. It is one of the three ingredients in the composition of gunpowder, and that which occasions it to take fire so readily.

Preparations of sulphur are used in various instances where purification is desired, and their excellence for these purposes consists in their quality of absorbing oxygen, or vital air. On account of the oxygen they contain, they are recommended for diseases in the lungs; and for the same purpose, used to preserve wines.

Sulphur, *Flowers of*, a fine powder into which *sulphur* is volatilized, if exposed to the heat of 170° of Fahrenheit.

Sulphuret, a compound substance, of which sulphur is one of the parts. Sulphuret of iron, a mineral composed of sulphur and iron, which is found in many parts of the world, and which was formerly called pyrites or firestone; or, more specifically, sideritis.

SULPHURIC *acid*. When sulphur is exposed to the temperature of 302°, it takes fire spontaneously, burns with a blue flame, yields a strong odour, and, by combining with the oxygen or vital air of the atmosphere, has a tendency to destroy life, by suffocation. This vapour, which is composed of the volatilized particles of sulphur, and oxygen, is called sulphuric acid.

SULPHUROUS *acid*, a combination of *sulphur* with oxygen, in which the proportion of the latter is less than in the sulphuric acid; and it is a rule observed in all oxygenous mixtures, to distinguish those in which the larger quantity of oxygen is present by the termination *ic*, and those in which the lesser by the termination *ous*. Vapours of sulphur have the property of bleaching or whitening almost every substance with which they come in contact.

"Sulphats," salts composed of sulphuric acid, and alkalies, earths, or oxyds, or rusts of metals.

"Sulphites," salts, composed of sulphurous acid and alkalies, earths, or oxyds of metals.

SULTAN, or SOLDAN, an oriental word signifying a lord or ruler, and used as a title for the sovereigns of several states. In the Roman polity, there is an officer, who acts as *marshal* in public processions, and in taking offenders into custody, who is called *soldan*.

SUMACH, a shrub, the leaves and young branches of which are used in dying the green colour, and in the preparation of black morocco and other leather.

Summer, in cosmography, one of the seasons of the year, commencing, in the higher northern latitudes, on the day the sun enters Cancer, and ending when it quits Virgo; or, more strictly and universally, the summer begins when the sun's meridian distance from the zenith is the least, and ends when it is a mean between greatest and least.

Sumptuary laws, laws forbidding or commanding certain practices in dress and modes of living. All the sumptuary laws, considered merely as such, once in force in England, are either obsolete, or abrogated by a statute of the 1st of James I. but there are several modern ones, having the increase of manufactures or of revenue for their object.

Sun, in astronomy, the most conspicuous of the heavenly bodies, which occupies the centre of the system, which comprehends the earth, the primary and secondary planets, and comets. The sun is the magnificent luminary which enlightens these worlds, and by its presence constitutes day. We have referred to this article from the fixed stars, because the sun agrees with them in several particulars, as in the property of emitting light continually, and in retaining constantly its relative situation with but little variation: they may have probably many other properties in common. The sun is, therefore, justly considered as a fixed star comparatively near us; and the stars as suns at immense distances from our earth; and we reasonably infer from the same analogy, that the stars are possessed of gravitation, and of the other general properties of matter, they are supposed to emit heat as well as light; and it has been conjectured that they serve to cherish the inhabitants of a multitude of planetary bodies revolving round them.

In a paper on the "Constructions of the Heavens," Dr. Herschel says, it is very probable, that the great stratum called the milky way is that in which the sun is placed, though perhaps not in the centre of its thickness, but not far from the place where some smaller stratum branches from it. Such a supposition will satisfactorily, and with great simplicity, account for all the phenomena of the milky way, which, according to this hypothesis, is no other than the appearance of the projection of the stars contained in this stratum, and its secondary branch.

In another paper on the same subject, he says, that the milky way is a most extensive stratum of stars of various sizes admits no longer of the least doubt: and that our sun is actually one of the heavenly bodies belonging to it is as evident.

The sun, like many other stars, has probably a progressive motion, directed towards the constellation Hercules. Dr. Herschel, on this subject, observes that the apparent proper motions of 44 stars out of 56 are nearly in the direction which would be the result of such a real motion of the solar system; and that the bright stars Arcturus and Sirius, which are probably the nearest to us, have, as they ought, according to this theory, the greatest apparent motions. Again, the star Castor appears when viewed with a telescope, to consist of two stars, of nearly equal magnitude; and though they have both an apparent motion they have never been found to change their distance with respect to one another a single second, a circumstance which is easily understood if both their apparent motions are supposed to arise from the real motion of the sun.

The sun revolves on his axis in 25d. 10h. with respect to the fixed stars; this axis is directed towards a point about half way between the pole star and Lyra, the plane of the rotation being inclined a little more than 7° to that in which the earth revolves. The direction of this motion is from west to east. All the rotation of the different bodies which compose the solar system as far as they have been ascertained, are in the same direction, and likewise all their revolutions excepting those of the comets, and those of some of the satellites of the Herschel planet.

The time and the direction of the sun's rotation are ascertained by the change of the situation of the spots, which are usually visible on his disc, and which some astronomers supposed to be elevations, and others to be excavations in the luminous matter covering the sun's surface. These spots are frequently observed to appear and disappear, and they are in the mean time liable to great variations, though they are generally found about the same points of the sun's surface. Dr. Herschel, in an ingenious paper, attributes the spots to the emission of an æriform fluid, not yet in combustion, which displaces the general luminous atmosphere, and which is afterwards to serve as fuel for supporting the process; hence he supposes the appearance of copious spots to be indicative of the approach of warm seasons on the surface of the earth, a theory which he has attempted to maintain by historical evidence. The exterior luminous atmosphere has an appearance somewhat mottled, some parts of it, appearing brighter than others, have been called faculæ, but Dr. Herschel distinguishes them by the names of ridges and nodules. These spots are usually surrounded by margins less dark than themselves, which are called shallows, and which are considered as parts of an inferior stratum, consisting of opaque clouds, capable of protecting the immediate surface of the sun from the excessive heat produced by combustion in the superior stratum, and perhaps rendering it habitable to animated beings.

To which Dr. Young replies, if we inquire into the intensity of the heat which must necessarily exist wherever this combustion is performed, we shall soon be convinced that no clouds, however dense, could impede its rapid transmission to the parts below. Besides the diameter of the sun is 111 times as great as that of the earth, and at its surface, a heavy body would fall through no less than 450 feet in a single second; so that if every other circumstance permitted human beings to reside on it, their own weight would present an insuperable difficulty, since it would become thirty times as great as upon the surface of the earth, and a man of moderate size would weigh above two tons.

Dr. Herschel, in another paper supposes, that the spots in the sun are mountains on its surface, which, considering the great attraction exerted by the sun upon bodies placed at its surface, and the slow revolution it has about its axis, he thinks may be more than 300 miles high, and yet stand very firmly.

The sun, then, appears to be a very eminent, large, and lucid planet, evidently the first and only primary one belonging to our system. Its similarity to the other globes of the solar system, with regard to its solidity; its atmosphere; its surface diversified with mountains and vallies; its rotation on its axis; and the fall of heavy bodies on its surface; leads us to suppose that it is most probably inhabited, like the rest of the planets, by beings whose organs are adapted to the peculiar circumstances of that vast globe. If it be objected, that from the effects produced at the distance of 95,000,000 miles, we may infer, that every thing must be scorched up at its surface. We reply, that there are many facts in natural philosophy which shew that heat is produced by the sun's rays only when they act on a calorific medium: they are the cause of the production of heat by uniting with the matter of fire which is contained in the substances that are heated; as the collision of the flint and steel will inflame a magazine of gunpowder, by putting all the latent fire which it contains into action. On the tops of mountains of sufficient height, at the altitude where clouds can seldom reach to shelter them from the direct rays of the sun, we always find regions of ice and snow. Now, if the solar rays themselves conveyed all the heat we find on this globe, it ought to be hottest where their course is the least interrupted. Again, our aeronauts all confirm the coldness of the upper regions of the atmosphere; and since, therefore, even on our earth the heat of the situation depends upon the readiness of the medium to yield to the impression of the solar rays, we have only to admit that on the sun itself, the elastic fluids composing its atmosphere, and the matter on its surface, are of such a nature as not to be capable of any extensive affection of its own rays; and this seems to be proved by the copious emission of them, for if the elastic fluids of the atmosphere, or if the matter contained on the surface of the sun, were of such a nature as to admit of an easy chemical combination with its rays, their emission would be very much impeded. Another well known fact is, that the solar focus, of the largest lens thrown into the air, will occasion no sensible heat in the place where it has been kept for a considerable time, although its power of exciting combustion, when proper bodies are exposed, should be sufficient to fuse the most refractory substances.

It is by analogical reasoning that we consider the moon as inhabited. For it is a secondary planet of considerable size, its surface is diversified, like that of the earth, with hills and vallies. Its situation with respect to the sun, is much like that of the earth; and by a rotation on its axis, it enjoys an agreeable variety of seasons, and of day and night. To the moon our globe would appear a capital satellite, undergoing the same changes of illumination as the moon does to the earth. The sun, planets, and the starry constellations of the heavens, will rise and set there as they do here: and heavy bodies will fall on the moon as they do on the earth. There seems, then, only to be wanting, in order to complete the analogy, that it should be inhabited like the earth. It may be objected, that, in the moon, there are no large seas; and its atmosphere (the existence of which is doubted by many) is extremely rare, and unfit for the purposes of animal life; that its climates, its seasons, and the length of its days and nights, totally differ from ours; that without dense clouds, which the moon has not, there can be no rain, perhaps no rivers and lakes. In answer to this, it may be observed, that the very difference between the two planets strengthens the argument. We find even on our own globe, that there is a most striking dissimilarity in the situation of the creatures that live upon it. While man walks on the ground, the birds fly in the air, and the fishes swim in the water. We cannot surely object to the conveniences afforded by the moon, if those that are to inhabit its regions are fitted to their conditions as well as we on this globe of ours. The analogy already mentioned establishes a high probability that the moon is inhabited.

This way of considering the sun is of the utmost importance in its consequences. That stars are suns can hardly admit of a doubt. Their immense distance would effectually exclude them from our view, if their light were not of the solar kind. Besides, the analogy may be traced much further: the sun turns on its axis; so does the star Algol, so do the stars called β Lyræ, Cephei, η Antinoi, ο Ceti, and many more, most probably all. Now from what other cause can we, with so much probability, account for their periodical changes? Again, our sun's spots are changeable; so are the spots on the star ο Ceti. But if stars are suns, and suns are inhabitable, we see at once what an extensive field for animation opens to our view.

It is true, that analogy may induce us to conclude, that since stars appear to be suns, and suns, according to the common opinion, are bodies that serve to enlighten, warm, and sustain a system of planets, we may have an idea of numberless globes that serve for the habitation of living creatures. But if these suns themselves are primary planets, we may see some thousands of them with the naked eyes, and millions with the help of telescopes; and, at the same time, the same analogical reasoning still remains in full force with regard to the planets which these suns may support.

Sunday, the first day of the week, so named from the sun. Sunday is also called the Lord's-day, because kept holy in memory of the resurrection of Christ; and the sabbath-day, because substituted, in the Christian worship, for the sabbath of the Jewish. This substitution was first decreed by Constantine the Great, A. D. 321, before whom, both the old and new sabbath were observed by Christians. Christians, says a French writer, have consecrated this day to worship, to rest, and to recreation. It would seem that, in the commencement of the Christian discipline, it was desired, at once to abolish, and to re-establish the sabbath. To abolish it, because by so doing, judaism would be most easily obliterated, and because it had been found difficult to continue the festival, and yet prevent its too minute observance; to re-establish it, because the institution was good.—In effect, this day was snatched from the tyranny of the master, and from that of our own avarice; it was a day given to rest, for the recovery of exhausted strength; to reflection, for its deliverance from the stupor of incessant occupation; to friendship, for the encouragement of its amiable intercourse. It is very true that on *Sunday* people gamble, drink, and fight, more than on any other day; but what is it that vice does not abuse? Every *Sunday*, order, restored, gives to the humble cottager a renewal of cheerfulness; takes from age somewhat of its infirmity: and restores to youth its spirit, and its charms. Every *Sunday*, children are reunited to their parents: and the lover to the object of his love. Let us preserve *Sunday*. Is it too much to give one day in seven to the adoration of God, to self-enjoyment, and to the brotherhood of our fellow-creatures?

Supercargo, a person employed by merchants to go a voyage with their cargo or lading, and dispose of it to the best advantage.

Superficies, in geometry, a magnitude considered as having two dimensions, or extended in length and breadth, but without thickness or depth.

Supernumerary, something over and above a fixed number. In several of the public offices are supernumerary clerks to be ready on extraordinary occasions. There are also supernumerary surveyors of the excise to be ready to supply vacancies when they fall; these have half-pay.

Supplement, *of an arch*, in geometry, is the number of degrees which it wants of being an entire semi-circle; as a *complement*, signifies what an arch wants of being a quadrant.

Supporters, in heraldry, figures in an achievement placed by the side of the shield, and seeming to support or hold up the same. In this country none under the degree of a banneret are allowed the honour of supporters, which are restrained to those called the high nobility. The supporters of the British arms are a lion and unicorn. In case of marriage of two parties, both of whom are entitled to supporters, one of each may be borne.

Superstition, a habit of the human mind, attributed to those who are thought to attach religious importance to things of a too trivial nature; or to those who are thought wrong in their ideas of the government of the world, not on the side of excluding supernatural agency, but the reverse.

Supremacy, in British polity, the sovereignty of the king over the church; and which sovereignty chiefly consists in the follwing prerogatives:

1. The bishops and clergy cannot be summoned to convocation by the archbishops, without the king's express consent. 2. The convocation cannot enact canons without his consent. 3. The king, in chancery, may be appealed to from the archbishop; and on such an appeal, a commission under the great seal may be directed to certain persons, of whom half are commonly laymen, and half clergymen (and which constitute what is called the *court of delegates*), empowering them to decide such appeal; and even this decision is subject to review. 4. The king can grant commissions for visiting such places as are exempt from the jurisdiction of the bishops or archbishops. 5. Persons in holy orders are not, as they once were, exempt from the king's temporal laws. 6. The clergy must take the oath of allegiance and supremacy to the king.

Surety of the peace, a deed whereby a person in danger of hurt from another is secured by a bond or recognizance, acknowledged to the king by the latter, and his bail, for keeping the peace.

Surgeon, in the army and navy, a commissioned officer whose duty it is to take care of the sick and wounded. He acts as physician and apothecary, as well as surgeon. He has the assistance of a mate, who is appointed by warrant. Both surgeon and surgeon's mate, must have passed examinations before the corporation of surgeons.

Surname, a name added to a person's baptismal, proper, or peculiar, name, and denoting the family to which he belongs.

De Cange imagines the *sur*-name to have been so called because it was formerly written *sur* (over) the *proper*; as, *de Bourbon*,
Louis:
while Camden derives it from *sur*, as being added over or above the other, in a metaphorical sense only.

I. The most ancient *surnames* were formed by adding the name of the father to that of the son, in which manner were produced several English *surnames*, ending with the word son; thus, *Thomas William's son*, makes *Thomas Williamson*. In Arabia, a man is never called by his proper name: if his name be *Zoar*, and his father's *Haly*, he is called Aven-*Haly* (the son of *Haly*) and *his son*, Aven-*Zoar*.

II. The feodal system introduced a second description of *surnames*, consisting of those of places; as Sutton, Aston, Devereux: and these were originally written with the particle *de* or *of*; as Henry de Sutton.

III. Another class of *surnames* has sprung from offices; as Steward, Chamberlain.

IV. The lower ranks of people sometimes took their *surnames* from their trades; as *Taylor*, *Baker*. Those who had not even these accidents to distinguish them, were left to the primitive mode of using the father's names as additions. In *domesday-book*, those below officers, as *Camerarius* and *Dapifer*, are noted by baptismal names only.

V. A fifth kind of *surnames* originated in an attribute or pick-name of the first possessor; as *Lack-land*, *Long-shanks*, *Blunt*; which latter is derived from *blond*, *flaxen-haired*.

VI. A medley of *surnames* remain to be mentioned, which have been formed by adopting the names of various things and persons; as *Wren*, *Lamb*, *Rose*, *Field*, *North*, *St. John*.

Surnames were never used in Sweden before the year 1514; and the common people, like those of Ireland, Poland, Bohemia, and perhaps some in Wales, are still without them. The Welsh did not begin to form *surnames* long before the beginning of the eighteenth century; and the mode of constructing them is by suppressing the *a* in *ap*, which signifies "the son of:" thus for *Evan-ap-Howell*, they now say Evan Powel. The words "the son of," are expressed by the Irish, by *mac*; as it was amongst the old Normans, by *fitz*.

Surrogate, in the civil law, a deputy, or person substituted for another. The word is most commonly used as the title of a bishop's chancellor.

Surveying, the art of measuring land, laying down its dimensions upon paper, and finding its content or area. Surveying, which is dependant on geometry, was the parent of that science. It is founded upon the point, the line, the angle, and superficies or surface. It consists of three branches of practice; the first that of taking the necessary measures and observations, and which is peculiarly called surveying; the second, that of putting the measurements and observations upon paper, and which is called plotting, or protracting; the third, the finding the area of the ground thus plotted, and which is called casting up.

Sus, the hog, in natural history, a genus of the Mammalia of the order Belluæ. The animals of this genus are allied by their teeth to carnivorous quadrupeds, and by their cloven feet to the ruminating ones. They feed almost indifferently upon animal and vegetable substances. They use their snout for digging up the ground in quest of roots, and are fond of rolling and wallowing in mud. The Sus Babyroussa is a very remarkable species. The upper tusks are placed externally, and turn upwards in a curve towards the forehead. It abounds in the Indian islands, lives solely on vegetables, and rests itself, in sleep, by hooking its upper tusks round the branch of a tree. The Sus Sajassu, or the Mexican hog, is the only animal of this genus which is native of America, where it is gregarious, fierce and highly dangerous. It is occasionally seen in herds of several hundreds. It is said to attack the rattle snake, and even devour it.

Suspension, or points of suspension, in mechanics, are those points in the axis or beam of a balance, wherein the weights are applied, or from which they are suspended.

Sweden, including the greater part of ancient Scandinavia, is divided into Sweden Proper, Gothland, Finland, Swedish Lapland, and the Swedish

Islands. The chief towns are Stockholm, the capital, which stands on seven rocky islands, united by wooden bridges, Upsal, famous for its university, Gothenburg, in Gothland, Tornea, and Abo in Finland. Sweden is celebrated for its mines of silver, copper, lead and iron. The mines are so spacious as to afford commodious habitations for numerous families. Sweden is a very mountainous country, and is celebrated for the number and extent of its lakes: its rivers are numerous, but few of them only are navigable. They have their rise from the mountains in Norway. South Lapland is connected with Sweden, as North Lapland is with Denmark, and East Lapland with Russia. Lapland, in general, is covered with immense forests, chiefly of fir; and with pastures full of rein-deer. In some parts of Lapland the sun is absent for about seven weeks. The stars are visible at noon, and the moon shines for weeks without intermission: but in the summer the sun never sets for seven weeks together.

Swedenborgians, or members of the *New Jerusalem church*, followers of the doctrines of Emanuel Swedenborg, a Swedish baron who died in London, in the year 1772. This person taught that all those passages of scripture which are generally understood to refer to the destruction of the world, really mean, the destruction of the old christian church, both catholic and protestant; an event which took place in 1757, when the second advent of Christ was accomplished, and the New-Jerusalem church erected. The commencement of this second Emanuel's mission is to be dated 1743; when the Lord appeared to him in person, and, by opening his spiritual eyes, enabled him, not only to see three distinct senses in the scriptures, but also to enjoy frequent intercourse with spirits and angels. 'As often as I conversed with angels, face to face,' he observes, 'it was in their habitations, which are like to our houses on earth, but far more beautiful and magnificent; having rooms, chambers, and apartments in great variety; as also spacious courts, belonging to them, together with gardens, parterres of flowers, fields, &c. where the angels are formed into societies. They dwell in contiguous habitations disposed, after the manner of our cities, in streets, walks, and squares. I have had the privilege to walk through them, to examine all round about me, and to enter their houses; and this when I was fully awake, having my inward eyes opened.'

In point of doctrine, Swedenborg announced, that man is possessed of free-will in spiritual things; that immediately after death, he rises again in a spiritual body, which is previously inclosed in his material one; that in this spiritual body he lives as a man to eternity, either in heaven or in hell, according to the quality of his past life: that salvation can be obtained by repentance only; and that repentance consists in abstaining from evil because it is a sin against God, and in living a life of charity and faith, according to the commandments.

SWIMMING, the buoyance and progressive motion of a body, and particularly of an animal body, in water. A very large proportion of the animal tribes are furnished with a greater or less capacity for swimming. Fishes are wholly adapted to it; amphibious creatures, as much, if not more so, as to walking; web-footed birds pass a considerable part of their existence upon the surface of the water, and many of them occasionally make their way beneath it; the same may be said of innumerable species of insects; and all quadrupeds are at least capable of preserving their lives if accident immerses them in this element, while some resort to it with peculiar readiness. Man alone is incapable of swimming, without learning to do so, as an art.

The reason of this peculiar inability of the human race, is attributed to the construction of the body; and especially of the head, from which results a situation of the center of gravity wholly different from that in quadrupeds. Of man, the head, with respect to the body, and compared with the heads of other animals, as proportioned to their bodies, is singularly heavy; a quality occasioned by the larger quantity of flesh, bones, and brain, with which it is furnished; and the absence of those sinuses, or cavities, which, like air-bladders, lighten that of other animals. The head of a man, therefore, sinks by its own gravity; and, thus exposing the body to fill with water, causes him to drown. Brutes, on the other hand, are able to keep their nostrils above water with facility, and thus, respiring freely, are, on the principles of statics, out of danger. From these observations it will follow, that the *art of swimming*, which can be acquired by exercise only, chiefly consists in keeping the head above water; and that the hands and feet are to be used as oars and helm, in managing, the course of the vessel. If a person, unacquainted with the art of swimming, and falling accidentally into the water, could command sufficient presence of mind to avoid all struggling and plunging, and to let his body take its natural position, he might continue long, safe from drowning. It is even said, that if a person in that state were able to keep his hands beneath the water, and make no efforts whatever, he could not sink. Fishes swim by means of their tails: their fins serve to preserve their equilibrium.

SWITZERLAND, remarkable for its mountains, and the simple character of its inhabitants, is divided into thirteen cantons; Zurich, Berne, Underwalden, Zug, Shweitz, Basil, Glaris, Soleure, Uri, Appenzel, Lucerne, Fribourg, and Shaffhausen. The principal towns are Basil, Berne, Zurich, and Lausanne, the last celebrated for the beauty of its situation. The sources of the Rhine and the Rhone, two of the grandest rivers in Europe, are to be found in the mountains of Switzerland. The lakes of Constance and Geneva have long been celebrated for their beauty. The Alps, which divide Switzerland from Italy; the mountains of St. Gothard, in the canton of Uri; and Mont Blanc, on the borders of Savoy; are the highest in Europe.

SYBILS, in antiquity, prophetesses, or women who delivered oracles. The sybils differ from the pythenesses, in that the latter delivered only the oracles of Apollo or the Sun. The pythenesses were so called from the serpent which, in almost every nation, was the symbol of the sun.

SYLLABLE, in grammar, a simple sound, whether composed of one letter, or of many. In every word, there are as many syllables as there are vocal sounds; and as many vocal sounds as simple or compound vowels permitted by the custom of the language to be sounded. Words of one syllable are called *monosyllables*; of two, *bissyllables*; of three, *trysyllables*; and of many, *polysyllables*.

Syllogism, in logic, a form of reasoning, consisting of three propositions; and of which the property is, that if the premises, or two first, be granted, the conclusion, or third, necessarily follows: thus,

1. The eagle is a bird;
2. Every bird is a biped;
3. Therefore the eagle is a biped.

An "hypothetical syllogism" is one in which the premises are supposed, or conditional; as, "If the eagle is a bird, it is a biped; but the eagle is a bird, therefore it is a biped."

An "analogical syllogism" founds the conclusion upon similitude; "As the base is to the column, so is justice to the commonwealth: but if the base be withdrawn, the column is overturned; therefore if justice is taken away, the commonwealth is overturned."

Symbol, a mark, sign, or badge, or representation of any one thing by another, of which there are various kinds, as types, enigmas, parables, fables, allegories, emblems, hieroglyphics. The characters of the Chinese alphabet, being known to represent things symbolically, are sometimes called symbols. Symbol, on medals, any figure which represents a quality or attribute; as the thunderbolt accompanying the heads of certain emperors, and denoting sovereign authority.

Synagogue, in the Jewish hierarchy, an assembly for the purposes of public worship; or the building in which such assembly is held. It was not till after the jews were of opinion that the worship of God might be performed in other places than the temple at Jerusalem, that synagogues began to be used. They were then built in all their cities: Jerusalem alone contained four hundred and eighty.

Syndic, in politics and commerce, an officer intrusted with the affairs of a city, or other community. The syndic, as his name imports, is to answer for the whole body; and at the same time control and correct all failings of individuals within the body. In effect, he is the general agent and censor. The chief magistrate of Geneva was formerly called a syndic. Four syndics were chosen every year, the eldest of whom presided in the council of twenty-five; by which body all business, civil and political, was transacted.

Syngenesia, see **Botany**.

Synod, in church history, a council or assembly of Ecclesiastics, assembled for discussing matters of religion.

Synovia, the name given to a liquid secreted within the capsular ligaments of the joints, to facilitate motion by lubricating the parts.

Systole, in anatomy, the contraction of the heart whereby the blood is drawn out of its ventricles into the arteries: the opposite state to which is called the diastole, or dilation of the heart.

Syntax, in grammar, the construction of sentences. Syntax, as an art, is to be divided into two branches; the one common to all languages, and by which words are made to agree in gender, number, case, person, and mood; the other peculiar to each language, and by which one mood is made to govern another, and the consequent variations effected. The first of these called concord and the second government.

The Syntax of concord, as it regards the English language, is extremely simple and obvious. It enjoins, as enumerated above, only five rules, and these of easy observance.

1. Words must agree in gender. This is a rule which, in the English language, can scarcely be violated; no one says 'The boy has flown her kite,' nor 'The mare has kicked his master.'

2. Words must agree in number; that is, the plural must be used with the plural, and the singular with the singular: thus, it cannot be said, 'Is the places taken?' 'Are the man at work?' 'We was walking along,' or 'You were a polite young gentleman.'

3. Words must agree in case; that, is the nominative, &c. must be put with the nominative, &c. It is possible, even in the English language, to transgress this rule, though not so frequently in that as in others: thus it must not be said, 'The house belongs to I,' nor 'Me built the house;' 'You whom approach,' nor 'You who I love.'

4. Words must agree in person; that is, we must not say, 'We sends,' but 'We send;' nor 'He bring,' but 'He brings.'

5. Words must agree in mood.

There are in the conjugation of verbs five moods or modes of speaking, to each of which is to be preserved its pure character.

All verbs express action or being; and the modes of verbs answer to the modes in which it is possible to speak of action or being: thus, The Indicative mode expresses absolute action; as 'I ride,' 'I did ride,' 'I have rid,' 'I had rid' 'I shall ride,' 'I shall have rid.'

The Imperative mode expresses commanded action; as 'let me ride.'

The Potential mode expresses potency, or power, of action; as 'I may or can ride,' 'I might, would, could, or should ride,' 'I may or can have rid,' 'I might could or would, or should have rid.'

The Subjunctive mode expresses conditional action: as 'If, or though, I ride,' 'If, or though, I rid,' 'If, or though, I have rid,' 'If, or though, I had rid,' 'If, or though, I shall have rid.'

The Infinitive mode expresses general action; as 'To ride.'

It will here be sufficient to remark, that if, in speaking of absolute action, the Imperative, Potential, Subjunctive, or Infinitive mode be used, the syntax of concord is neglected; and so of each other mode respectively.

Syntax of government is more complex than the former; but, as this complexity arises only from the number of objects embraced, and as the rules propounded are not arbitrary but founded in reason (not so much to be learned by heart, as to be understood) there can be no doubt but that by a moderate degree of attention, the learner may furnish himself with complete knowledge.

The first rules of the syntax of government are these:

1. Every nominative case must have a relation to a verb, expressed or understood; that is, it is impossible to speak concerning any nominative

case, or object, without saying something of that object, and what we say of that object is the verb: thus, the word 'dog,' if no verb were expressed or understood, would be but an inarticulate cry; but the truth is, that where we say 'dog,' some verb, as 'come,' though not expressed, is nevertheless understood. In a word, whenever we speak of an object, we mean to say something concerning its being or action; as 'the rose is sweet,' 'the dog runs.' Every nominative case, therefore, must have a relation to some verb.

2. Every verb must have its nominative case, expressed or understood: thus, the words 'I know' mean nothing, unless the name of an object, or a word implying the name of an object, be expressed or understood; as 'I know the man,' or 'I know him.'

3. Every adjective must have a relation to some substantive; thus, the word 'ripe' is senseless, unless a substantive, as 'fruit,' be expressed, or understood.

4. Every genitive case is governed by some other noun; as 'the branch of a tree.'

Obs. 1. A word is said to govern another, when it determines the case or mode in which that other shall be put.

Obs. 2. The nominative case by which the word is governed, may always be discovered by applying the question 'who,' or 'what,' to the verb; as 'who lives?' the prince; 'what grows?' the plant.

On all occasions, the single and natural rule observed, is that of placing the most important part of a sentence at its close; a rule in compliance with which, the natural order of words may sometimes be wholly transposed.

It is in this part of *syntax*, however, that the source of a thousand errors is concealed. From inversion, whence springs so much of the grace of language, springs also endless solecisms, or affectations; and, hence, endless obscurities.—In this place, it must suffice to warn the young writer, that the first merit of language is intelligibility; its first grace, purity; and that every other excellence is subordinate. Let him study *syntax* with assiduousness, and trust to nature for the rest.

SYSTEM, in science and philosophy, a word applied to something *complete;* as the planetary *system*, or the *whole* of the bodies supposed to belong to each other; a *system* of botany, or that which comprehends the *whole* science of plants; a *system* of philosophy, or a theory or doctrine which embraces the *whole* of philosophy.

SYZYGY, in astronomy, a term equally used for the conjunction and opposition of a planet with the sun.

T.

T, the nineteenth letter and fifteenth consonant of our alphabet, the sound of which is formed by a strong expulsion of the breath through the mouth upon a sudden drawing back of the tongue from the fore part of the palate, with the lips at the same time open. The proper sound of this letter is in *tan*, *ten*, &c. When it comes before *i* follow-ed by a vowel, it is sounded like *s* as in *nation*, *portion*, &c. When *h* comes after it, the sound is two-fold, as in *thin*, *thief*, &c.

Tabby, in commerce, a thicker kind of *taffety*. Tabby is usually *figured*, or as it is called, *watered*. This is done by means of a calender, the iron or copper rolls of which are engraved. The parts engraved pressing but little, if at all, upon the stuff, occasion that inequality of the surface by which the rays of light are differently reflected. No *water* or dye is used.

Tactics, a term which relates to those evolutions, manœuvres and positions which constitute the main spring of military and naval finesse: tactics are the means whereby discipline is made to support the operations of a campaign, and are in every regular service, studied for the purpose of training all the component parts according to one regular plan or system; whereby celerity, precision, and strength are combined, and the whole rendered completely efficient.

Tænia, the *tape-worm*, in natural history, a genus of the vermes class, containing more than a hundred species, infesting mammalia, reptiles and fish. The animals of this genus of worms are destined to feed on the juices of various animals, and are usually found in the alimentary canal, generally at the upper part of it. They are sometimes collected in great numbers, and occasion the most distressing disorders. They have the power of reproducing parts which may have been broken off or torn away. The physiology of the tænia is curious; it appears destined to feed upon such juices of animals as are already animalised, and is therefore commonly found in the alimentary canal, where there is abundance of chyle, for chyle seems to be its natural food. As it is thus supported by food which is already digested, it is destitute of the complicated organs of digestion. The tænia solium is most frequent in this country, and is from three to sixty feet in length. It is one of the most simple vascular animals in nature: the food is taken into its mouth, and passes into the alimentary canal, and is thus made to visit in a general way the different parts of the animal. It has no excretory ducts, so that the whole of the alimentary fluid seems adapted for nourishment: the decayed parts probably dissolve into a fluid which transudes through the skin which is extremely porous. This animal has nothing resembling a brain or nerves: it is probably propagated by ova, which may easily pass along the circulating fluids of other animals.

Tadpole, see Rana.

Taffety, or taffeta, in commerce, a fine and smooth silken stuff, and which is usually remarkable for its lustre or gloss.

The manufacture of alamode, or the glossy taffety, is said to have originated with Octavius May, of Lyons. This man's affairs being embarrassed, he was one day musing on his misfortunes; and during his reverie he chanced to chew a few threads of silk which he had in his mouth. On spitting these threads away, his attention was attracted by their glossiness; and, reflecting on the circumstance, he concluded that this quality must have been produced by three causes: 1. the pressure of his teeth; 2. the glutinousness of the saliva with which it had been wetted; and 3. the warmth of his mouth. These processes he set himself to imitate; and by so doing, acquired, for himself, an immense fortune, and for Lyons, its great reputation in this article of commerce.

The contrivances by which May executed his idea were these: the taffety was stretched between two rollers; and the lustre was given by rubbing it gently with a ball, or a handful of lists of fine cloth, moist with a glutinous composition, as it was drawn from one roller to the other; meanwhile, a charcoal fire, in a kind of carriage, moving on trundles, and of the breadth of the taffety, was carried under it, and, by this means, the moisture dried.

Talc, in natural history, a glossy species of stone, easily separated into thin and transparent scales or leaves.

Talc is found in various parts of the world. In England, Northamptonshire is the district most peculiarly known for this production.

The Romans used the talc brought from Russia both for window-lights, and for the pavement of magnificent buildings. The Russian talc may be used for lanterns, and for covering miniature paintings.

Tales, in law, additional jurymen, when those impanelled do not appear, or, appearing, are challenged.

Tallow, animal fat, melted and clarified.

Tallow is used in making soap, and in dressing leather; but chiefly for the manufacture of candles.

"Tallow-tree," a tree growing in China, and remarkable for producing a substance resembling tallow; in every minute particular, and applicable to the same purposes.

The tallow-tree is about the height of the cherry. Its leaves are in the form of a heart, glossy, and of a deep red colour. Its bark is very smooth. Its fruit, which is inclosed by a kind of coat resembling that of a chesnut, is composed of three grains, of the size and form of a small nut. Each grain is a body of tallow, encompassing a stone.

Tally, a word used to signify a piece of wood cut into a convenient form for receiving marks by which accounts may be kept.

Tallies are still used in the Exchequer.

Talmud, or **thalmud**, a Jewish commentary on the law of Moses.

The talmud, which is received as part of the rule of faith and conduct, contains many particulars upon which the law is silent.

The talmud consists of two general parts; the one called the *mischna*, the other, the *gemara*: the mischna is frequently called, absolutely, *the talmud*.

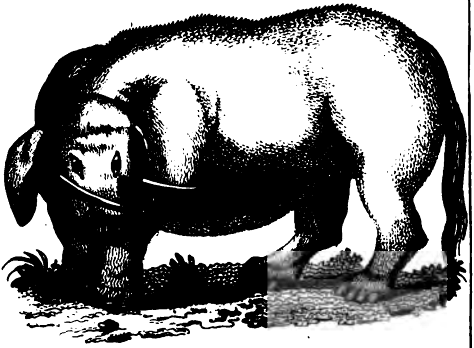
Talus, in fortification, the slope of a work.

Tangent, see **Trigonometry**.

Tanning, the preparation of *skins*, by means of which they are rendered into *leather*. The first part of this preparation consists in taking off the hair, which is effected by steeping in lime-water. When this is done, and every thing superfluous is removed with the knife and the pumice, as in the preparation of parchment, the skin is put into the *tan*; that is, being stretched in a pit, it is covered with tan, and the pit filled with water.

Tantalus, the *ibis*, in natural history, a genus of birds of the order Grallæ, of which there are nine-

44.



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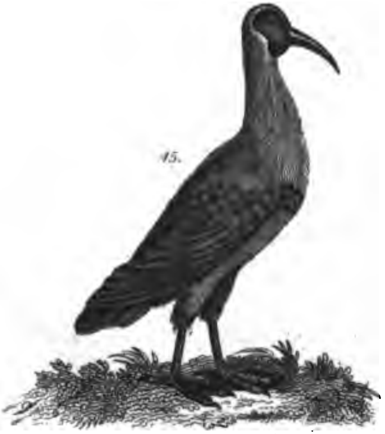


Cooper Sculp.

Fig. 44. **Sukotyro** *Indicus.*
Fig. 45. **Tantalus** *melanocephalus: black-headed ibis.*

Published by J. Harris, St. Pauls Ch. Yd. 1811.

teen species. The tantalus ibis, or Egyptian ibis, is more than three feet long, and as large as a stork. On the retreating of the Nile it is found in Lower Egypt in great numbers, subsisting on insects and frogs. It perches on palm trees, and sleeps in an erect attitude. It is supposed by some naturalists to be the ibis of the ancients, and is known to destroy and devour serpents. See Plate Nat. Hist. fig. 45.

Tapestry, in a general sense, any kind of hangings for a wall, or bed; but, in a restricted one, a curious production of the loom, wherein the finest pictures may be represented. It is supposed that the English and Flemish, who were the first that, in the northern parts of the world, excelled in this art, learned it of the Saracens, during the crusades. Colbert, the celebrated minister of Lewis XIV. established *Gobelin's* manufactory of tapestry, in the neighbourhood of Paris. See Gobelins.

Tar, a gross liquor of a pitchy nature, obtained from the wood and bark of aged pines, or firs. Tar either flows from incisions made in the tree, or, when that is quite dead, is forced from it by burning.

Tare, is an allowance for the outside package that contains such goods as cannot be unpacked without detriment, or for paper, thread, bands, cord, &c.

Targum, in sacred literature, a name given by the Jews to certain glosses and paraphrases of the scripture, written in the Chaldaic language; a work which was occasioned by the long captivity of that people.

Tartar, in chemistry, a salt which rises from wines. Tartar is either *white* or *red*, according to the colour of the wine from which it is produced. That brought from Germany is the most esteemed: for, being formed in vast tuns, some of which hold a thousand pipes of wine, it has time to arrive at that stony consistence which is one of its most important qualities.

"Cream of tartar," a new crystallation of tartar, after it has been powdered, and resolved in boiling water.

TARTARY, in geography: this word in its most extensive sense contains all that vast country of Asia, which lies between the Frozen ocean to the north, and Persia, Hindostan, and China to the south, and includes a great variety of nations to which is applied the general name of Tartary, with a particular one often applied to the local situation.

TAURUS, in astronomy, one of the twelve signs of the Zodiac, the second in order, consisting of forty-four stars according to Ptolemy, but according to the Britannic catalogue of one hundred and thirty-five.

TAUTOLOGY, in syntax, a needless repetition of the same words; or of the same thing in different words. Of these, the first is generally the effect of inadvertence; the second, a faulty habit of composition. Many persons who scrupulously avoid the former, perpetually fall into the latter.

The rule of avoiding the recurrence of the same words being easily learned by heart, while the reason is utterly unattended to, is also an abundant source of absurdities of another class. Many writers take pains to vary their words on occasions in which their perfect sameness is indispensably required. Locke has well observed of such a practice, that it is as perplexing or dishonest as would be that of an accountant who should use different figures to express the same sums. We must always distinguish between *tautology* and *repetition*; for, while the former is a great imperfection in writing, the latter is often as great a merit: in declamation it gives grace, and in argument, precision.

Tax, a word at present employed for all imposts by which money is raised for the service of the state; but, anciently, it had a more peculiar meaning. It differed from the subsidy, in that it was levied on towns, while the latter was levied on persons; and, what is most essential, the subsidy was variable, but the tax was fixed; thus the subsidy was regulated by the occasion; the tax by ancient estimate of the wealth or value of a place. It is said that in England, before Edward I, the taxes were settled at the king's pleasure.

Tea (which is called Tsjaa by the Chinese), in commerce, the leaf of a shrub growing in China, Japan and Siam. The tea-tree is fond of a stony soil, and thrives best in a southern aspect. The leaves are green, narrow, of about an inch and a half in length, and serrated or jagged all round. The flower is like that of the wild rose, but smaller. This is succeeded by a round ligneous shell, with three ridges, and three cells, each filled with one spherical seed, or with several angular seeds. There are various species of this tree, and these of various heights, from one foot to an hundred. Some specimens cannot be fathomed by two men; while others rank among the feeblest of shrubs. The bou-tsjaa, or bohea, is about five or six feet in height.

Tears, the name of a limpid fluid secreted by the lachrymal glands, and flowing on the surface of the eye. The uses of tears are the following: 1. They continually moisten the surface of the eye and eye-lids, and prevent the pain which the friction would occasion. 2. They wash away the dust, or any thing acrid, that may have fallen into the eye. The mucus of the nose consists of the same substances as the tears, but being more exposed to the air, it acquires a greater degree of viscidity from the mucilage absorbing oxygen.

Telegraph, the name of an instrument by means of which information may be almost instantaneously conveyed to a considerable distance. The modern telegraph was first used by the French in the spring of 1794: it was invented by M. Chappe, who caused it to be used in the following manner: At the first station, which was on the roof of the Louvre, he received in writing from the Committee of Public Safety, the words to be sent to Lisle, near which the French army at that time was. An upright post was erected on the Louvre, at the top of this were two transverse arms moveable in all directions, with much rapidity. The different positions of these arms stood as signs for the letters of the alphabet; and these he reduced in number as much as possible. Having received the sentence to be conveyed, he gave a signal to the second station to prepare. At each station there was a watch-tower, on which telescopes were fixed, and the person on the watch gave the signal of preparation which he had received, and this com-
successively through all the line, which
into a state of readiness. The per-

tion at the second station received letter by letter the sentence from the Louvre which he repeated with his own machine; and this was again repeated from the next with almost inconceivable rapidity to the final station at Lisle. Telegraphs of various constructions have since been erected in this country, and are now in general use for the public service.

TELESCOPE, an optical instrument, consisting of several lenses or glasses, fitted to a tube; and through which things distant are seen as if near at hand. The lens turned towards the object is called the *object-glass*; and that to which the eye is applied, the *eye-glass*; and if the telescope consist of more than two lenses, all but the *object-glass* are called *eye-glasses*.

The invention of the telescope, like most other inventions, appears to have dawned upon mankind by gentle degrees. A simple tube, formed by the hand, was found to direct the view, or render it more distinct, by singling out the object to be examined, and defending the eye against the rays reflected from others. The experience of this fact led to the use of more efficacious tubes, formed of some convenient material. In the thirteenth century, a manuscript was adorned with a picture of Ptolemy in the act of observing the stars through a tube of four joints or draws; but it was not till the middle of the sixteenth century (1549), so far as any records evince, that the use of glasses in this instrument was discovered. This benefaction to philosophy is uniformly attributed to John Baptist Porta, a Neapolitan.

From this period, the telescope, though probably progressively improved, made no considerable advance till the seventeenth century. Hitherto, no artist had made a telescope of above a foot and a half in length; and it was Marius in Germany, and Galileo, in Italy, who first made long ones, adapted to celestial observations. The common refracting telescope consists of an object-glass, and an eye-glass: it inverts the image with respect to the object; and is unfit for viewing terrestrial objects. In fig. 29, Plate Miscellanies we have the representation of the section of such a telescope: *x y* is the distant object to be viewed, the image of which is by means of the lens *o p* formed at *m d*, this is the focus of the eye glass *g h* and the pupil of the eye being in the other focus, the image will be viewed under the angle *g e h*, and will of course appear magnified. The magnifying power of this telescope is found by dividing the focal distance of the object-glass by the focal distance of the eye-glass: thus if the focal distance of the lens *o p* be 120 inches, and it admit of an eye-glass whose focal distance is 2 ½ inches or 2.5; then 120 ÷ 2.5 gives 48 for the number of times that such a telescope will magnify the diameter of an object.

To shew terrestrial objects erect, the telescope must have one object-glass *c d* fig. 30, and three eye glasses *e f*, *g h*, and *i k*. The three eye-glasses have all their focal distances equal, and therefore the magnifying power is found by dividing the focal distance of the object-glass by the focal distance of either of the eye-glasses.

The reflecting telescope may be thus described: let *a b* fig. 31, be a distant object, parallel rays issuing from it, will be reflected from the concave mirror *c d* to its focus *m* at *s t* where the image is

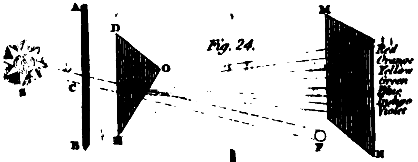


Fig. 24.

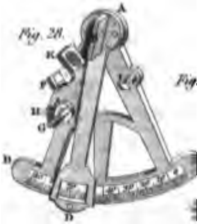


Fig. 28.

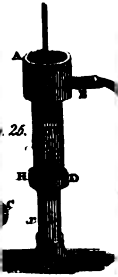


Fig. 25.

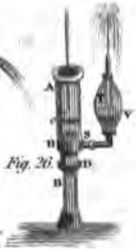
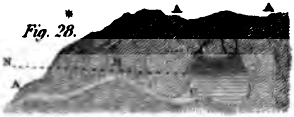


Fig. 26.



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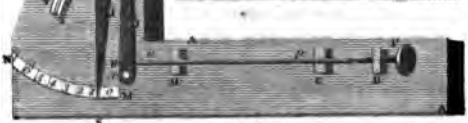


Fig. 27.

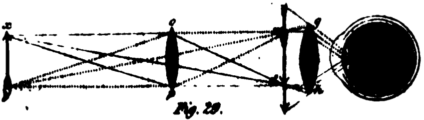


Fig. 29.

Cooper Sculp.

Published by J. Harris St Pauls Ch Yd

formed; there they cross and pass on to the small mirror *e n*, from which they are reflected through the hole *o* in the large mirror to R where there is a plano-convex lens, which causes them to form an erect image at *r*, which is magnified by the lens S, and is seen by the eye as large as *x y*. There are various constructions of the reflecting telescope, but the principle is nearly the same in all.

Teller, an officer in the exchequer of which description there are four, whose business it is to receive all monies due to the state. The *tellers'* places are in the gift of the crown.

Tellurium or sylvanite, a metal lately discovered in the mountains of Fatzbay, in Transylvania. Tellurium is of a white colour, like tin, with somewhat of the greyness of lead. It is very brittle, but as easily melted as lead.

Templars, Knights-Templers, or Knights of the Temple, a religio-military order, established at Jerusalem, A. D. 1118, for the protection of pilgrims and croises against highway robbers. During nearly six hundred years, this order maintained an important character in Europe. In every nation, it had a particular governor, called *master of the Temple*, or of *the militia of the Temple*. Its riches became immense; a fact which, among many others, justifies the observation of Raynal, that persons who have laid down rules for religious societies have done so with the sole view of making holy men; but that they have laboured more directly and more effectually to make rich ones.

Towards the beginning of the seventeenth century, the Templers were charged with leaning to the Mohammedans; and, in consequence, the order was abolished under pope Clement V. Edward II. of England, Philip the Fair, of France. In 1307, all the members in England were arrested, and of these, seven were burnt alive. In 1312, the final suppression was effected by the council of Vienna, by the direction of which fifty others of these persecuted men suffered death in the flames.

TEMPLE, in ancient architecture, a building designed for religious purposes. The word appears to be derived from the Latin *templare*, "to contemplate."

The circular temple, consisting of a dome supported by columns, between which the space is open, has also a reference to the act of contemplation. These were built for the accommodation of the augurs while engaged in contemplating the flight of birds. Hence, likewise, originated the *dome* which was given to architecture by the Latins, while the angular roof and pediment are derived from the Greeks.

TEMPLES, in the description of London, a pile of buildings situate close to the Thames, at the extremity of the city. Here anciently stood the inn or dwelling-house of the knights templars; and when that order was abolished, it was purchased by some professors of the common law, who converted it into hospitia, or inns of court. They are called the INNER and MIDDLE Temples, in relation to Essex-house, which was also a part of the inn of the Templars, and denominated the *outer* Temple, because lying without Temple-bar, a gate of the city. The chief officer of the Templars, the Master of the Temple, was summoned to parliament in the 49th of

Henry III. This name has descended to the minister of the Temple church.

Tenacity, a term applied to metals, by which is meant the power that a metallic wire of a given diameter has of resisting, without breaking, the action of a weight suspended from its extremity.

Tendon, in anatomy, the hard, white, extreme part of a muscle whereby it is fastened to the bone.

Tense, in grammar, a barbarous word used by English grammarians, derived from the French *temps*, "time." The tense marks the time at which a thing is said to be done.

The simple tenses, or times, are three; present, past, and future; as, 'I walk, I have walked, I 'shall walk.'

As the past tense, however, may either express the thing as just done or past, or, indefinitely, that is, merely as done; and as the future may either express definitely, 'to come under precise circumstances,' or, indefinitely, merely as 'to come;' so each of these tenses have two forms: the definite preter tense having the form, 'I have walked,' and the indefinite, 'I walked;' and the definite future tense, the form, 'I shall have walked,' and the indefinite, 'I shall walk.'

Besides the three simple tenses, others have been invented, called compound tenses, expressing the relations of the simple ones to each other. The first expresses the relation of the past to the present, and is called the preterimperfect tense, because it does not mark the thing simply and properly as done, but as imperfect, and present with respect to another thing past, as 'I was walking when he came.' The second compound tense marks the time past in a double manner, and is therefore called the pluperfect; 'I had walked.' The third compound tense is the definite future.

Some grammarians describe the compound tenses as so called because they cannot be formed without the assistance of another verb, as 'I have walked.'

Tension, the state of any thing stretched out, as a line. Animals sustain and move themselves by the tension of their muscles and nerves: a chord or musical string, gives an acuter or deeper sound, as it is in a greater or less degree of tension, that is, more or less stretched.

Termes, in natural history, a genus of insects of the order aptera: there are ten species of this genus, of which the termes fatale, or white ant, is most curious. It exceeds in wisdom and policy the bee, the ant, or beaver, and is found in the East-Indies, in Africa, and South America. They build pyramidal structures 10 or 12 feet high, and divide them into appropriate apartments, magazines for provisions, arched chambers, and galleries of communication. These are so firmly cemented that they will bear almost any weight, and they appear like the villages of the natives. With such wonderful dexterity and rapidity do they destroy whatever comes in their way, that in a few hours a large beam will be eaten to a mere shell, not thicker than writing paper. The larva are the labourers, who build structures, procure provisions, and take care of the eggs. The pupæ never work but act as superintendants over the labourers, or as guards to defend their habitations from violence. When a breach is made in the dwelling, they rush forward and defend the entrance, with great ferocity; some of them beating with their mandibles against any hard substance, as a signal to the other guards, or as an encouragement to the labourers: they then retire, are succeeded by the labourers, each with mortar, who sets about to repair whatever injury has been sustained. One of these attend every six or eight hundred labourers who are building a wall, taking no active part, but encouraging others to labour.

TESTACEA, in natural history, an order of the class vermes, of which there are thirty-six genera. The animal is a mollusca, that is a soft animal of a simple structure, covered with a calcareous habitation or shell. The shell has been considered as analogous to the bones of animals, although its formation and growth are very different, since it serves as a base or support to the muscles, which are attached to its internal surface. The principal use of the shell is, however, to serve as a covering or defence to the animal. Testaceous animals are not only extremely different in external form, but also in the mode of their production. Some are viviparous, as most of those that inhabit bivalve shells, multivalves, and some univalves, while the others, which form the greatest proportion, are oviparous. In one point they all agree, that whatever be the mode of their production, whether from an egg, or otherwise, the shell is formed on the body of the young animal, and is proportioned to its bulk.

TESTUDO, the tortoise, in natural history, a genus of amphibia, of the order reptiles. Land tortoises, known in this country, live to an astonishing age, one in the gardens at Lambeth lived to the age of 120 years. The testudo mydas, or common green turtle brought from the West Indies, is in the highest estimation as an article of food.

Tetrahedron. See **Body.**

Thane, also written thean, tain, tein, and *tanus*, a title of Saxon nobility, which after the Norman conquest, gave place to that of baron. "Thane-land," the same with boc-land, or book-land; so called because, consisting of fiefs held of the crown, it was booked; while the folc-land or land of the folk or people, which was private property, naturally remained unnoticed.

Thea, in botany, tea-tree, is a native of Japan, China and Tonquin, and has not been found spontaneous in any other part of the world. There are two species, the bohea and green: the leaves are not fit for plucking till the shrub is of three years growth.

Theist, a word which, though literally synonymous, must not be confounded with that of deist. The first, by custom is generical, the second specific. If an historian should tell us that the people of such or such a nation were *theists*, we should understand in a general way, that they acknowledged the existence of God; but if he said that they were *deists*, we should conclude that they acknowledged the existence of God, but admitted no system of revealed religion. There is only one sense, in which the word *theist* is in the least degree specific; and this is, in opposition to polytheist: for, by the first term we should understand a man that acknowledges one God; by the second, one that acknowledges many.

Theodolite, a mathematical instrument, much used in surveying, and which is made of various forms.

Thermometer, an instrument for measuring the degree of heat. The word means a *heat-measure.* The principle upon which the thermometer is constructed is that of the expansion of bodies, produced by the presence of caloric. The quicksilver in the bulb being expanded, every increase of heat necessarily requires a greater space for its substance, and therefore rises in the tube. In the construction of thermometers, two extremes, the one of heat, and the other of cold, being given, the space between the point to which the quicksilver rises in the one, and that to which it sinks in the other, is graduated, or divided into regular parts or degrees. It consists of mercury enclosed in a glass tube, which is fixed to a graduated frame. There are various kinds of thermometers, but that chiefly used in this country is called Fahrenheit's, from the inventor. It is represented in Plate Miscellanies, fig. 32. A is a bulb containing the mercury, A B the tube hermetically sealed, and it is so contrived as to be perfectly free from air: the mercury rises by heat and sinks by cold. The tube is fastened to the frame.

The scale is thus formed: ice or snow is always of the same temperature: so is boiling water, provided the weight of the atmosphere is the same: these then are made the standard points from which the scale proceeds. The tube is put into pounded ice, and when it has remained in it sufficiently long to come to its lowest temperature, the place against the upper edge of the mercury is marked 32°: it is then gradually introduced into boiling water, and when it will rise no higher, the altitude of the mercury is marked 212°. The space between these two points is to be divided into 180 equal parts called degrees, and the parts below 32, and above 212 are likewise to be equally divided, and if below 32 the length go beyond 0, then the other divisions are to be marked —1, —2, —3, &c. The scale is now to be finished by writing against 32° *freezing* against 55° *temperate*: against 76° *summer-heat*: 98° *blood-heat*: 112° *fever-heat*: against 212° water boils.

The utmost extent of the mercurial thermometer, both ways, is 600°; and 40° below 0, because in the former case mercury boils, and in the latter it congeals; therefore beyond these degrees mercury is no guide.

Thibet, in geography, a country in Asia, and part of Independent Tartary, extending from the source of the Indus to the borders of China, and from Hindostan to the deserts of Kobi. It is called by the natives *Pue* on account of the great coldness of the climate. In many parts, the inhabitants are in a state of considerable cultivation; their houses are large, lofty, and built of stone; the useful manufactures are in some degree of improvement.

Thunder and Lightning are well known by their direful effects; but the theory of these phenomena is still involved in some degree of obscurity. The most plausible account of them appears to be the following. In summer great quantities of exhalations, from sulphureous and other combustible substances, are, by the solar heat, raised into the atmosphere, and carry along with them a great deal of electric matter; so that positive electricity is more or less predominant in the highest regions of the atmosphere where the vapours begin to be condensed. It is stronger in fogs where vapour is more condensed, so as to be almost reduced to drops, and stronger still when thick fogs are resolved into clouds. When this matter is accumulated in any particular strata, it will induce in them changes similar to what is induced upon plates of glass piled on each other. Therefore, if a stratum of air be positively electrified, the stratum above it will be negative, the stratum above that positive, and so on. Now, if an imperfect conductor, as a cloud composed of vesicular vapours mixed with particles of air, come into contact with two such strata, the equilibrium would be restored, and this would be attended with a thunder-clap, and with a flash of lightning. If a positive stratum be situate near the earth, and a cloud intervene, the electrical fluid will, with a loud explosion, discharge itself into the earth; but if the stratum be negative, the contrary effects will take place. Thunder, however, is seldom occasioned by a discharge of electric matter into the earth, or from the earth into the atmosphere. That every discharge of electricity produces some change similar to those of combustion, appears from this circumstance, that light and a sulphureous smell accompany all electrical discharges. In general, a course of hot weather precedes a thunder storm, and in summer seldom terminates without it. In the East and West Indies, where the climate is hotter than in Europe, thunder and lightning are more frequent and more violent than in this temperate region.

A thunder storm is indicated by the following appearances: viz. when one dense cloud, or more, increasing fast in size, rises into the higher regions of the air, the lower surface being black and nearly level, and the upper finely arched and well defined. Sometimes these clouds are piled upon one another, uniting and extending their arches. At the time of the rising of this cloud, the atmosphere is commonly full of separate clouds, that are stationary and of whimsical shapes. Upon the appearance of the thunder cloud, all these move towards it, and gradually become more uniform in their shapes, till drawing near it, their extreme parts approach one another, and soon coalesce in one mass. But sometimes, the thunder cloud will increase in size, without the conjunction of other clouds, the vapours in the atmosphere forming themselves into clouds wherever it passes. Some of the adscititious clouds appear like white fringes, at the skirts of the thunder cloud, or under the body of it, but they become darker and darker as they approach to unite with it. When the thunder cloud is greatly increased in size, its lower surface is often ragged, and partly detached towards the earth, but still connected with the rest. Sometimes the lower surface swells into various large protuberances bending downward; and sometimes one whole side of the cloud will have an inclination to the earth, and the extremity of it nearly touch the ground. When the eye is under the thunder cloud, after it is grown larger and well formed, it is observed to sink lower, and to assume a more dense and dark appearance, at the same time that many small clouds are seen to move rapidly in various directions. While these clouds are agitated, the rain commonly falls in abundance; and if the agitation be very great, it hails. While the thunder cloud is swelling to a great extent, the lightning darts from one part of it to another, and often illuminates the whole mass. The longer the lightning continues, the less dense does the cloud become, and the less dark its appearance, till at length it bursts, disperses, and shews a clear sky.

Thursday, the fifth day of the week, so named by the Saxons from *Thor*, or that personification of the Deity under which he is represented as the god of thunder, or, more generally, of vengeance: men having imagined that a storm of thunder was an expression of the displeasure of heaven.

Tiara, an ancient crown which does not appear to have always the same shape. Among the Persians, however, it was formed like a half moon, and from this is derived the *mitre*.

Tide, a regular swell of the ocean, occurring once in every twelve hours. When the moon is in its first and third quarters, the tides are high and swift, and are called spring tides; when in the second, lower, and slower, and called neap tides. The motion of the ocean, which affects all rivers, to a certain distance from their mouths, is thus described and explained: for certain hours, the water flows from north to south; in this motion, or flux, which lasts six hours, it gradually swells, so that, entering the mouths of rivers, it drives them backward to their heads or springs: after a continual flux of six hours, it seems to rest for about a quarter of an hour; it then begins to ebb, or retire back, from north to south for six hours more, in which time, the water sinking, the rivers resume their natural course; then, after a seeming pause of a quarter of an hour, it begins to flow, as before, and thus alternately. Thus the sea ebbs twice a day, and flows as often; but not always at the same hours. The period of a flux and reflux is 12 hours and 50 minutes; so that the tides return later and later each day, by 50 minutes, or three quarters of an hour and 5 minutes. Now, 12 hours and 50 minutes is a lunar day; that is, the moon passes the earth's meridian later and later each day, by 50 minutes: so that the sea flows as often as the moon passes the meridian, both the arch above, and that below the horizon; and ebbs as often as it passes the horizon, both at the eastern and western points. The whole of these phenomena are admirably accounted for, on the principle of gravitation; according to the conjecture of Kepler, that if the earth ceased to attract its waters toward itself they would rise and flow into the moon: a conjecture which afterward received the scientific demonstration of Newton.

Tile, in building, a thin brick, made in the same manner as common bricks, though of better clay, and used for covering houses.

Flemish or *Dutch* tiles were formerly much used for lining fire-places. They are made of a whitish clay, like the coarse earthern-ware.

Tilery, a tile-work, a shed under which tiles are dried. *Tileries*, or *Tuileries*, is the name of a palace at Paris, the scite of which, together with its garden, which joins the *Louvre*, was formerly occupied by a tile work.

Timber, a name for all kinds of felled and seasoned woods, and used in building, carpentry, joinery, and turnery.

Timber, *to measure round*, let the mean circumference be found in feet and decimals of a foot: square it, multiply this square by the decimal 0.079577, and the product by the length. Example: Let the mean circumference of a tree be 10.3 feet, and the length 24 feet. Then 10.3 × 10.3 × 0.079577 × 24 = 202.615, the number of cubical feet in the tree. The foundation of this rule is, that when the circumference of a circle is 1, the area is 0.07957747l5, and that the areas of circles are as the squares of their circumferences. But the common way used by artificers for measuring round timber, differs much from this rule. They call one fourth part of the circumference the girth, which is by them reckoned the side of a square, whose area is equal to the area of the section of the tree; therefore they square the girth, and then multiply by the length of the tree. According to their method, the tree of the last example would be computed at 159.13 cubical feet only.

Mr. George Smart, well known for his practical knowledge of mechanics, in almost every department, says, that after making many experiments on timber, and comparing them with those of Belidore, Buffon, &c. the differences were so great that it would be wasting time to enumerate them. He therefore mentions some useful observations necessary to be known by all those mechanics who use timber; and points out some evident errors in a table of Belidore's, supposed to be the result of the best set of experiments ever produced in transverse strains. He tells us, that a bar of wood, thirty-six inches long, and one inch square, supported at the ends by two props, will break with a weight of 187 pounds on the middle, if it is loose at the ends; but if the ends are firmly fixed, it will require 283 pounds to break it. "This appeared to me," says Mr. Smart, "so great an error, that I was induced to put little or no confidence in many of his experiments; and, in consequence, I made two laths of fir, of the same dimensions, one with a strong shoulder at each end, to prevent its bending, which having firmly fixed in a frame, it carried a weight more than ten times greater than that which was loose."

Mr. Smart has, in a paper, in the "Repertory," given directions how to cut and join timber so as to have the greatest strength, and to turn to the greatest advantage, of having the best part of the tree in the place where the hardness and strength are most wanted, viz. in the corners which form the abutments; whereas, the same tree squared into a parallel beam, would have been much smaller, and the soft or sappy parts of the wood exposed to the action of the air and moisture. In flush-framing it is observable, that the failure of all timber in old buildings has commenced much sooner than they otherwise would have done, owing to the sappy wood being at the corners of the principal beams, which soon decays, as its spongy quality attracts the moisture; whereas the heart, especially of oak, will be as sound as the first day it was used.

Time, a succession of phenomena, in the universe, or a mode of duration, marked by certain periods or measures, chiefly by the motion and revolution of the sun. The idea of time, in the general, Mr. Locke observes, we acquire by considering any part of infinite duration as set out by periodical measures: the idea of any particular time, or length of duration, as a day, an hour, &c. we acquire first, by observing certain appearances at regular, and, seemingly, at equidistant periods. Now, by being able to repeat those lengths or measures of time, as often as we will, we can imagine duration, where nothing really endures or exists; and thus we imagine to-morrow, next year, &c. Time is either *astronomical* or *civil*; *astronomical* when considered with respect to the motion of the heavenly bodies only; and *civil*, when considered with reference to the subdivisions of centuries, years, months, days, hours, minutes and seconds, which have been adapted to this or that portion of mankind. Of civil time, the modes of reckoning at present usual in Europe are spoken of under the articles *Day*, *Stile*, and *Year*, but it will be proper to describe, in this place, a new system which was established in the republic of France. The particulars are these:

The æra of the French was reckoned from the foundation of the republic; that is from the 22d of September, A. D. 1792. On the 21st, the representatives of the people had assembled in national convention, and pronounced the abolition of royalty. On the 22d, their determination was proclaimed in Paris, and this day was decreed the first of the republic.

The disposition of the months, which were also newly named, will be seen in the following

COMPARATIVE TABLE OF THE FRENCH AND ENGLISH KALENDARS.

	French Months.		*Sig. of the Names.*	*English Months.*	
AUTUMN.	1. Vindemiaire	1	Vintage	September	22
		10		October	1
	2. Brumaire	1	Foggy	———	22
		11		November	1
	3. Frimaire	1	Frosty	———	21
		11		December	1
WINTER.	4. Nivôse	1	Snowy	———	21
		12		January	1
	5. Pluviôse	1	Rainy	———	20
		12		February	1
	6. Ventôse	1	Windy	———	19
		11		March	1
SPRING.	7. Germinal	1	Springing	———	21
		12		April	1
	8. Floréal	1	Flowery	———	20
		12		May	1
	9. Prairial	1	Haying	———	20
		13		June	1
SUMMER.	10. Messidor	1	Harvest	———	19
		13		July	1
	11. Thermidor	1	Hot	———	19
		14		August	1
	12. Fructidor	1	Fruit.	———	18
		15		September	1

TIN, in mineralogy, a genus of metals, of which there are three species: 1. Tin-pyrites; colour intermediate between steel-grey and brass-yellow; but usually more inclined to the first; it occurs massive and disseminated; internally it is glistening, sometimes shining, and seldom passing into splendent; its lustre is metallic; it is brittle, and the specific gravity is somewhere between 4.3 and 4.8. Before the blow-pipe, it gives out a sulphureous odour, and melts easily, without being reduced, into a black scoria. It communicates a yellow or green colour to borax.

It is found at Wheal-rock and St. Agnes, in Cornwall, where it occurs in a vein about nine feet wide, accompanied with copper pyrites and brown blende.

Tin is not found in many countries; but where it exists at all, it is in very considerable quantities. In Europe there are only three tin districts: the first is in Saxony and Bohemia; the second in Cornwall; and the third is that of Gallicia, on the borders of Portugal. It is found in many parts of Asia, and in South America. It is worked as an ore of tin, and from it all the tin of commerce is obtained. Its name is derived from the quantity of tin which it affords, and its unmetallic aspect.

Tin is a metal of a silver-white colour, very ductile, and malleable, gives out, while bending, a crackling noise, is fusible at a heat much less than that of ignition, is soluble in muriatic acid, and, by dilute nitric acid, is rapidly converted into a white oxide. Tin has been known from the earliest ages. It was much employed by the Egyptians in the arts, and by the Greeks; as an alloy with other metals. Pliny speaks of it under the name of white lead, as a metal well known in the arts, and even applied in the fabrication of many ornaments of luxury. He ascribes to the Gauls the invention of the art of tinning, or covering other metals with a thin coat of tin. The alchemists were much employed in their researches concerning tin, and gave it the name of Jupiter, from which the salts, or preparations of tin, were called Jovial. Since their time, the nature and properties of tin have been particularly investigated by many chemists, and it has proved the subject of some important discoveries in chemical science. Tin exists, in nature, in three different states. 1. It is found native; 2. In the state of oxide; and, 3. In that of sulphurated oxide. Native tin is in brilliant plates, or regularly crystallized. The native oxide of tin, which is the most common ore of this metal, exists under a variety of forms. It is generally found crystallized.

Of the alloys, the most important is that of tin and copper, with some other additions, which forms bronze, bell-metal, speculum-metal, &c. The alloy of tin and lead, in equal parts, forms plumbers solder. The alloy of tin, lead, and bismuth, in the proportions of 3, 5, and 8, forms a compound that melts in heat somewhat less than that of boiling water. The amalgam of mercury with tin is used in silvering of mirrors. Pewter is an alloy of tin and lead, which was formerly very much used, more so than any other metallic alloy, being the common material for plates, dishes, and other domestic utensils. Its use now is almost universally superseded by pottery, which is lighter, more readily kept clean, and much cheaper, though certainly less durable, on account of the brittleness of the latter. The name of pewter has been given to any malleable white alloy, into which tin largely enters, and its composition is so various, that hardly any two manufacturers employ precisely the same ingredients, and the same proportions. The finest kind of pewter contains no lead whatever, but consists of tin with a small alloy of antimony, and sometimes a little copper; and in all the superior kinds of pewter, the tin forms by far the greater part of the mixture. Pewter may be used for vessels containing wine, and even vinegar, provided there be from 80 to 82 parts of tin in the alloy, without the smallest danger; hence its use as a measure. The specific gravity of a mixture of tin and lead is no less than the mean specific gravity of the two metals separately.

Tin is much used, particularly in the state of very thin leaves: it is then called tin-foil. This is made from the finest tin, first cast into an ingot, then laminated to a certain extent, and afterwards beat out with a hammer. Tin is used for tinning copper, iron, &c. and the salts of tin are employed in dyeing.

Tin plate tinning. Tin combines with iron, and adheres strongly to its surface, forming a thin covering. This is one of the most useful combinations of tin, for it renders the iron fit for a great many valuable purposes, for which, otherwise, on account of its strong tendency to oxidation, or rusting, it would be totally inapplicable. This is well known by the name of tin-plate, or white iron.

Titanium, a mineral lately found by M. Klaproth, in Hungary, and by Mr. M'Gregory, in Cornwall. It is of a brownish red colour, and considerable lustre.

Tithes, in English polity, the tenth of all profits or fruits, paid to the clergy of the established church, for their maintenance.

Tobacco, in botany, is thus cultivated. After sowing tobacco seeds, the ground is watered every day, and in hot weather covered, to prevent its being scorched by the sun; and when the plants are grown to a convenient pitch, they are transplanted into a soil well prepared for their reception: care is also taken to keep this ground clear of weeds, and to pull off the lowest leaves of the plant, that ten or fifteen of the finest leaves may have all the nourishment. When these leaves are ripe, which is known by their breaking when bent, the stalks are cut, and left to dry two or three hours in the sun; after which they are tied together two and two, and hung on ropes under a shade to be dried in the air. And when the leaves are sufficiently dried, they are pulled from off the stalks, and made up in little bundles; which being steeped in sea water, or, for want thereof, in common water, are twisted in manner of ropes, and the twists formed into rolls, by winding them with a kind of mill around a stick: in which condition it is imported into Europe, where it is cut by the tobacconists for smoking, formed into snuff, and the like. Besides the tobacco of the West Indies, there are considerable quantities cultivated in the Levant, the coasts of Greece and the Archipelago, the island of Malta and Italy.

Toise, in military mensuration, is a French measure, containing 6 feet, or a fathom: a square toise is 36 square feet, and a cubical toise is 216 feet. These two measures correspond in the division of the feet; but these divisions being unequal, it is necessary to observe, that the proportion of the yard, as fixed by the Royal Society at London, to the half toise as fixed by the Royal Academy at Paris, is as 36 to 38.355.

Topaz, a gem or precious stone, of a fine yellow, or gold colour. The oriental topaz is most esteemed. Its colour borders on the orange. The occidental, or that found in Peru, is of a softer substance, but its colour is nearly the same.

Tornado, a sudden and vehement gust of wind from all points of the compass, frequent on the coast of Guinea.

A tornado seems to partake much of the nature of a whirlwind, or perhaps of a water-spout, but is more violent in its effects. It commences very suddenly, several clouds being previously drawn together, when a spout of wind, proceeding from them, strikes the ground, in a round spot of a few rods or perches diameter, and proceeds thus half a mile or a mile. The proneness of its descent makes it rebound from the earth, throwing such things as are moveable before it, but some sideways or in a lateral direction from it. A vapour, mist, or rain, descends with it, by which the path of it is marked with wet. The following is a description of one which happened a few years since at Leicester, about fifty miles from Boston, in New England: it happened in July, on a hot day, about 4 o'clock in the afternoon. A few clouds having gathered westward, and coming overhead, a sudden motion of their running together in a point being observed, immediately a spout of wind struck the ground at the west-end of a house, and instantly carried it away, with a negro man in it, who was afterwards found dead in the path of it. Two men and a woman, by the breach of the floor, fell into the cellar; and one man was driven forcibly up into the chimney-corner. These were preserved, though much bruised; they were wet with a vapour or mist, as were the remains of the floor, and the whole path of the spout. This wind raised boards, timbers, &c. A joist was found on one end, driven nearly three feet into the ground. The spout probably took it in its elevated state, and drove it forcibly down. The tornado moved with the celerity of a middling wind, and constantly declined in strength till it entirely ceased.

Tory, in British history, a political and religious faction, or party, opposite to the whigs. The term *tory* was an opprobrious name fixed by the *whigs* on enemies. It was the denomination of the Irish rebels. These, according to the *whigs*, were favoured by Charles I. and therefore the name was given to the king's party, at first called cavaliers. According to some, however, the distinctions of tory and whig were not known before the year 1678, in the reign of Charles II. when those who believed that the catholics conspired against the king and state, as deposed by Titus Oates, were called *whigs;* and those who disbelieved it, *tories.* See Whig.

Touch, or *Feeling*, sense of. When the mind has connected the complex ideas derived from the touch with the visible appearance of objects, then the sight is indefinitely the most useful medium of knowledge: but in the earliest stages of the intellectual progress, the touch is the most useful; in fact, as man is formed, it then is absolutely necessary to render the sight productive of most of its present utility. The sense of feeling differs from the other senses in belonging to every part of the body, external or internal, to which nerves are distributed. The term touch is most correctly applied to the sensibility which is diffused over the surface of the body. Touch exists with the most exquisite degree of sensibility at the extremities of the fingers and thumbs, and in the lips. The sense of touch is thus very commodiously disposed for the purpose of encompassing smaller bodies, and for adapting itself to the inequalities of larger ones.

The sensations acquired by the sense of feeling are those of heat, hardness, solidity, roughness, dryness, motion, distance, figure, &c. and all those corporeal feelings which arise from a healthy or diseased state of the nerves, and the part of the body to which they belong. The pains of this sense are more numerous and vivid than those derived from any other sense; and therefore the relicts of them coalescing with one another, constitute the greatest share of our mental pains, that is, pains not immediately derived from sensation. On the other hand, its pleasures being faint and rare, in comparison with others, and particularly those of the taste, have but a small share in the formation of the mental pleasures.

Tournament. From the old French word *Tournoi*, which is derived from *Tourner*, to turn. An exercise of honour formerly practised, wherein princes and gentlemen afforded specimens of their dexterity and courage in public places, by entering the lists and encountering all opposers. They were well mounted on horseback, clad in armour, and accoutred with lance and sword; first tilted at one another, and then drew their swords and fought hand to hand.

Treasurer, an officer to whose custody some

Plane trigonometry is the science which treats of the analogies of plane triangles, and of the methods of determining their sides and angles. For this purpose, it is not only requisite that the peripheries of circles but also that certain right lines in and about a circle, are supposed to be divided into some assigned number of equal parts. These lines are denominated sines, tangents, secants, &c. The sides of plane triangles may be estimated in feet, yards, chains, or by any other definite measures, or by abstract numbers; but the angles are measured by the arcs of a circle, contained between the two legs, having the angular point for its centre.

Every circle is supposed to be divided into 360 equal parts, called degrees; each degree into 60 equal parts, called minutes; each minute into 60 equal parts, called seconds. An angle is said to be of as many degrees, minutes, seconds, &c. as are contained in the arc, or part of the circumference, by which it is measured.

A right angle is measured by the fourth part of the circumference, or 90°; an obtuse angle is greater than 90°, and an acute angle is less than 90°. Degrees, minutes, &c. are marked at the top of the figures by which the arc is denoted. Thus we say 34° 28′ 50″, thirty-four degrees, twenty-eight minutes, and fifty seconds.

The difference of an arc from 90°, or a quadrant, is called its complement; and its difference from 180°, its supplement; thus in plate Miscel. fig. 33, the arc AB, is the complement HB: but AB is the supplement of BD.

A chord, or subtense, is a right line drawn from one extremity of an arc to the other: thus BE is the chord or subtense of the arc BAE, or BDE.

The sine, or, as it is sometimes called, the right sine, of an arc, is a right line drawn from one extremity of the arc, perpendicular to the diameter passing through the other extremity: thus BF is the sine of the arc AB, or BD.

The versed sine of an arc is the part of the diameter, intercepted between the arc and its sine: AF, is the versed sine of AB, and DF of the arc DB.

The co-sine of an arc is the part of the diameter intercepted between the centre and the sine, and is equal to the sine of the complement of that arc. Thus CF is the co-sine of the arc AB, and is equal to BI, the sine of its complement HB.

The tangent of an arc, is a right line touching the circle in one extremity of that arc, continued from thence to meet a line drawn from the centre through the other extremity; which line is called the secant of the same arc: thus AG is the tangent, and CG the secant of the arc AB.

The co-tangent and co-secant of an arc, are the tangent and secant of the complement of that arc: thus HK and CK are the co-tangent and co-secant of the arc AB.

The lines here described, belong equally to an angle as to the arc by which it is measured; and, except the chords and versed sines, they are all common to two arcs or angles which are the supplements of each other.

So that if the sine, tangent, &c. of any arc or angle above 90° are required, it is the same thing as to find the sine, tangent, &c. of its supplement, or what it wants of 180°.

They are also called the natural sines, tangents, &c. of the arcs or angles to which they belong; and the logarithms of the numbers by which they are represented, are the logarithmic sines, tangents, &c.

And as one or other of these lines make a part of every trigonometrical operation, they have been calculated to a given radius, for every degree, minute, &c. of the quadrant, and ranged in tables for use.

Whence, by the help of such a table, the sine, tangent, &c. of any arc or angle, may be found by inspection; and vice versa.

Trinitarian, a term formerly applied on various occasions; sometimes signifying one, whose sentiments on the trinity were in any wise different from those of the catholic church; and sometimes one who wholly denied the trinity: at present, it is generally used to denote an advocate for the doctrine of the trinity in opposition to an Unitarian, which see.

Troop, in military economy, a small body of cavalry or dragoons, usually about 50 in number, commanded by a captain, and answering to a company of foot.

Trope, in rhetoric, a word changed from its natural signification to another. See Rhetoric.

Tropics, in astronomy and geography, are two circles supposed to be drawn on each side of the equinoctial, and parallel thereto. That on the north-side of the line is called the tropic of Cancer, and the southern tropic has the name of Capricorn,

Fig. 30.

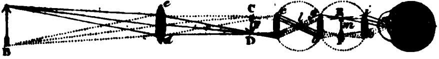
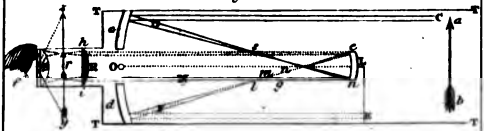


Fig. 31.



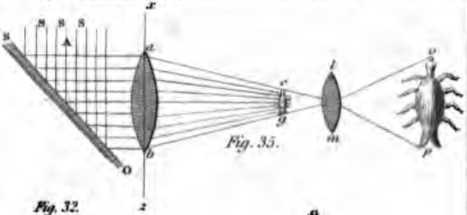
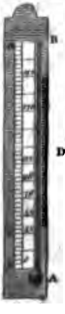


Fig. 35.

Fig. 32.



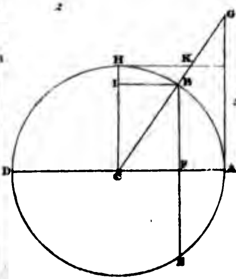
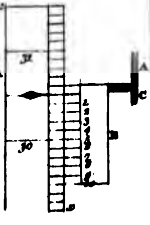


Fig. 33.

Fig. 34.



Cooper sculp.

Published by J. Harris St Pauls Ch. Yd [illegible].

as passing through the beginning of those signs. These are distant from the equinoctial 23° 29′. Two circles drawn at the same distance from the equator on the terrestrial globe, have the same names in geography, and they include that space or part of the sphere, which is called the torrid zone, because the sun is, at one time or other, perpendicular over every part of that zone, and extremely heats it.

TROY *weight*, formerly called trone weight, is supposed to be taken from a weight of the same name in France, which was taken from the name of the town of Troyes. The original of all weights used in England, was a grain of wheat, taken out of the middle of the ear, and, when well dried, thirty-two of them were to make one penny weight: twenty penny weights, one ounce: and twelve ounces one pound. Afterwards it was thought sufficient to divide the penny weight into twenty-four equal parts, called grains, which is the least weight now in common use.

TRUMPET, a musical instrument of the wind kind. It is usually made of brass; but sometimes of silver, iron, tin, or even wood.

TRUMPET, *speaking*, a tube, from six to fifteen feet in length, made of tin, perfectly straight, and having a very large aperture; the mouth-piece being big enough to admit both lips. By means of this instrument the voice is carried, with distinctness, for a mile or more. It is chiefly used at sea.

TUESDAY, the third day of the week, answering to the *dies Martis* of the Romans; but dedicated by the Saxons to *Tuisco*. The peculiar attribute of the Deity, worshipped under this name, is not clearly known.

Tun, a measure of capacity for liquids. The English tun contains two pipes, or four hogsheads, or 252 gallons.

Tungsten, a metal found in Sweden. Externally, it is of a dark-brown colour; internally, of a steel-grey.

Tunbridge water, a famous chalybeate water, found in England, at a place about five miles from the town of Tunbridge, in the county of Kent. This water is recommended in all the cases where that of the Spa is serviceable; the virtues of the former being of the same kind with those of the latter, though weaker.

Turcoise, in natural history, a precious stone of the opake kind, and a beautiful blue colour. Oriental turcoises are found in Persia, the Indies, and in some parts of Turkey; from which latter place it is supposed that they derive their name. The occidental, are found in various parts of Europe.

Turkey, one of the great sovereignties of the world which includes many countries, and provinces, in Europe, Asia, and Africa. In Europe may be reckoned Romelia, which comprehends Greece, Macedonia, Albania, Morea, Thessaly, with the islands of the Archipelago; part of Sclavonia, Croatia, Servia, Bosnia, Bulgaria, &c. In Asiatic Turkey are comprehended Natolia, Caramania, Syria, Turcomania, Diarbekir, and the three Arabias. In Africa the countries subject to the Turks are Barca, Egypt, and a great part of Nubia. The states of Algiers, Tunis, and Tripoli, are under the protection of Turkey. The whole is divided into governments, of which two are under the care of beglerbegs and the rest under pachas or bashas.

Turkey *company*. See **Levant**.

Turmeric, in pharmacy, and in dyeing, the root of a plant, growing in Madagascar and the East-Indies. In pharmacy, it is used on various occasions; particularly as a specific in the jaundice, and in the dropsy. In dyeing, its yellow colour heightens reds; but, considered by itself, it does not give so steady a yellow as weld.

Turning, in mechanics, a very ingenious and useful art, by which a great variety of articles are manufactured, by cutting or fashioning them while they revolve upon an axis or line, which in most cases remains immoveable. Every solid substance in nature may be submitted to this process, and accordingly we have articles turned in the metals, in wood, in pottery, in stone, in ivory, &c. The simplest process of turning is that of the potter, who, in the first stage of forming his ware, sticks a piece of humid clay upon a wheel, or flat table, while it revolves horizontally, and in this state of rotation of the clay, he fashions it with the greatest facility into vessels of every description. But in most operations of the art the revolving body is cut or shaved by applying a chissel, or other suitable tool, to its surface, while in motion; a condition that requires firmness in the action, axis of rotation, and also that the tool itself should be steadily supported. The instrument, or apparatus for these purposes, is called a lathe.

Turpentine, a resin flowing, either naturally, or in consequence of incision, from various sorts of trees; as the terebinthus, larch, pine and fir.

TUSCAN ORDER. See ARCHITECTURE.

TWELFTH-DAY, a festival of the Christian church, in commemoration of the visit paid by the Magi to the infant Jesus.

TYPE, in letter press printing. See FOUNDERY.

TYRANT, in antiquity, the same with monarch. By the association of ideas, the word has come to be used in an ill sense; that of a cruel or oppressive monarch.

V

V is a consonant, and as such is placed before all the vowels, as in *vacant*, *venal*, &c. Though the *v* and *u* had always two sounds, they had only the form of the *v* till the beginning of the fourth century, when the other form was introduced. In numerals V stands for 5, and with a dash at the top as V̄ for 5000.

VACCINATION, the inoculation with certain matter taken or derived from the cow, for the purpose of securing against the infection of the small pox.

VALOUR, courage, bravery, intrepidity. A generous quality, which far from assuming brutality and violence, with-holds the fury of the soldier, protects helpless women, innocent infants, and hoary age. Nothing which is incapable of resistance, can ever be the object whereon true valour would exercise its prowess. Courage is that grandeur of soul which prompts us to sacrifice all personal advantages, and even the preservation of our beings, to a love of doing our duty. The exercise of this determined courage in the profession of arms, is called *valour*. It is composed of bravery, reason, and force; by bravery we understand that lively ardour which fires us for the combat; reason points out to us the method of conducting it with justice and prudence; and force is necessary for the execution. It is bravery which animates the heart, reason springs from the soul, and force depends upon the body; without bravery we fear obstacles, danger, and death; without reason courage would have no legitimate view; and without force it would be useless: these three qualities should concur to form true military valour.

VALVE, in hydraulics, &c. is a kind of lid, or cover of a tube, or vessel, so contrived as to open one way, but which, the more forcibly it is pressed the other way, the closer it shuts the aperture, so that if either admits the entrance of a fluid into the tube or vessel and prevents its return; or admits its escape, and prevents its re-entrance: such are the valves in pumps whether for water or air; and such are those in the different parts of the veins of the body which open towards the heart, suffering the blood to flow to that organ, but preventing its return. See VEIN, &c.

VANILLA, a little black seed, growing in the hot climates, and used in the composition of chocolate, and to perfume tobacco and snuff. It is supposed to strengthen the brain and stomach.

VAPOUR, in physics, an assemblage of vesicules, or little bubbles of water, filled with air, which, being raised by the action of heat continues to float till it be condensed. The bodies of vapour which float in the atmosphere, and which in that situation we call clouds, are raised in immense quantities. Dr. Halley attempted to estimate the vapour drawn from the Mediterranean during one sunny day; and, by calculating the surface of that sea, and making an experiment on a small quantity of water, he was led to suppose, that it might be at least 5280 millions of tuns. Dry winds, also, carry off even a larger proportion.

It is by vapour redescending to the surface of the earth, in various forms, that all the phenomena of dew, rain, hail, and snow are produced. If the cold wind, or other cause, happen to act early enough to precipitate the vesicules, before they arrive at any considerable height, the drops, which in so short a descent do not unite to any considerable degree, are small; and thus is formed what we call dew; now, this precipitation regularly happening with respect to that vapour which rises late on a summer's day, a fall of *dew* is the natural consequence.

If the vapour is more copious, and the height to which it rises somewhat greater, than that supposed above, mist or fog is produced; if higher still, a *small rain*. If no cause of condensation occur, it accumulates into heavy clouds.

VARIATION, in geography, navigation, and experimental philosophy, a term applied to an irregularity of the magnetic needle. Though the poles of a magnet are denominated *north* and *south*, they do not constantly, and in all parts of the earth, point due north and south, but in most places, to the east or west of them, and with a considerable variation in a course of time. At the Cape of Good Hope, when, in 1486, it was discovered by the Portuguese, there was no variation; the needle there pointing due north: in 1622, it was about 2 degrees westward; in 1675, it was 8° W.; in 1700, about 11° W.; in 1756, about 18° W.; and in 1774, about 21½° W. At London, in 1580, the variation was 11° 15′ E.; in 1622, 6° E.; in 1634, 4° 5′ E.; in 1657, 0; in 1672, 2° 30′ W.; 1692, 6° W.; in 1753 about 16° W.; and at present, about 21° W. Besides this polar variation a magnetic needle, exactly balanced at its centre, will have a *declination* at its centre of about 70°. This is called, the *dipping* of the needle.

Varnish, in its more usual sense, any glutinous and glossy liquor, with which articles of manufacture may be covered, to improve their appearance, or to defend them from injury. Varnishes are usually made with gums and spirit of wine.

Copal or the best white varnish, is made of Venice turpentine, copal, elemy, benzoin, anime, and white rosin.

Varnishes for etching may be purchased ready prepared. Their materials are nearly as follow:

"Hard varnish." Take of burgundy pitch and rosin, of each five ounces, asphaltum, one ounce; first melt the asphaltum, then add the other ingredients; when melted, strain it; and when cold, tie it in a muslin bag. Or take asphaltum, mastic, amber, of each half an ounce, wax one ounce; melt them, and make them into rolls or balls, as above.

"Soft varnish." Take of wax, three ounces, mastich, two ounces, asphaltum two ounces, ; melt and strain, and make into balls as above.

"Turpentine varnish." Take of yellow rosin four ounces, spirit of turpentine, six ounces; powder the rosin, and digest with the turpentine in a gentle heat, till all is dissolved.

"Mastic varnish." Take of gum mastic four ounces finely powdered, oil of turpentine eight ounces; digest in a gentle heat, till dissolved, then pour off.

The soft varnishes are only used for stopping out.

"Asphaltum varnish." Take asphaltum, or Jews pitch, four ounces, of spirits of turpentine eight ounces; and digest as above.

VASSAL, in feodal customs, one who, in return for the possession of land, owes service, or at least homage, to the superior of whom it is held, and to whom, in case of his misconduct, it reverts.

VAT, a vessel used to hold wines, and other liquors, during the time of their preparation.

VEGETABLE. See PLANT.

VEIN, in anatomy, a vessel which receives the blood brought by the arteries, and carries it back to the heart. Veins are continuations of the extreme capillary parts of the arteries, reflected back again toward the heart. Uniting their channels, as they approach the heart, all the veins ultimately form three trunks: the *vena cava descendens*, which brings the blood from all the parts above the heart; the *vena cava ascendens*, which brings the blood from all the parts below the heart; and the *porta*, which carries the blood to the liver.

VELLUM, a finer kind of parchment. See PARCHMENT.

VELVET (from the French word *velours*, and that from *velu*, any thing covered with hair), a silk stuff, covered on the outside, with a close, short, fine, and soft shag. The nap, shag, or velveting of this stuff, is formed of part of the threads of the warp, which the workman puts on a long channelled ruler, or needle, and which he afterwards cuts by drawing a sharp steel tool along the channel of the needle, to the ends of the warp. The best manufactories of velvet are in France and Italy.

Veneering, in joinery, a kind of marquetry, or inlaying. It consists in coating ordinary wood with thin leaves of a finer sort.

Ventriloquism, an art of speaking, by means of which the human voice and other sounds are rendered audible, as if they proceeded from various different places; though the utterer does not change his place, and in many instances does not appear to speak. It has been supposed to be a natural peculiarity, because few, if any, persons have learned it by being taught; and we have had no rules laid down for acquiring it. It seems to have been in consequence of this notion that the name ventriloquism has been applied to it, from a supposition that the voice proceeds from the thorax or chest. From numerous attentive observations, it appears manifest that the art is not peculiar to certain individuals, but may with facility be acquired by any person of accurate observation. It consists merely in an imitation of sounds, as they occur in nature, accompanied with appropriate action of such a description as may best concur in leading the minds of the observers to favour the deception.

Any one who shall try, will be a little surprised to find how easy it is to imitate the noise made by a saw or by a snuff-box when opened or shut, or by a large hand-bell, or a cork-cutter's knife, a watch while going, and numberless other inanimate objects; or the voices of animals in their various situations and necessities, such as a cat, a dog, or a hen enraged, intimidated, confined, &c.; or to vary the character of the human voice by shrillness or depth of tone, rapidity or drawling of execution, and distinctness or imperfection of articulating, which may be instantly changed by holding the mouth a little more open or more closed than usual, altering the position of the jaw, keeping the tongue in any determinate situation, &c. And every one of the imitations of the ventriloquists will be rendered more perfect by practising them at the very time the sounds are heard, instead of depending on the memory. The leading condition of performance is that the voices and sounds of the dramatic dialogue to be exhibited, should succeed each other so rapidly that the audience should lose sight of the probability that one actor gives effect to the whole, and that where the business is simple the aid of scenery or local circumstance should be called in.

Venus, the most beautiful star in the heavens, is known likewise by the names of the morning and evening star. She is the constant attendant on the sun, and is never seen in the eastern quarter of the heavens when that luminary is in the western quarter. Venus has been sometimes seen moving across the sun's disc in the form of a black spot: this is called the transit of Venus. The transit of Venus happened but twice during the last century viz. in [illegible] nd 1769, and no other will occur till the editor of this dictionary and most of his contemporaries will be no more, viz. in 1874. From the transit of Venus in 1761 was deduced the sun's parallax, and of course his distance from the earth with very great accuracy. This distance was found to be somewhere between 95 & 96 millions of miles. This being obtained the distances of the other planets were easily found by observation and calculation.

Verb, in grammar, a word expressing an affirmation; as, the wind roared, did roar, or was roaring. The objects of affirmation are three; the existence or condition of a thing, the action of a thing, and the action upon a thing; or, according to the common definition, being, doing, and suffering.

From the several species of affirmation here enumerated, arise the distinction between neuter, active and passive verbs.

A "verb neuter" is that which simply affirms the being or existence of something; as, you live, you drink.

A "verb active" affirms the action of a thing with reference to some determined object; as, you drink water.

A "verb passive" affirms the action upon a thing; as, water is drank.

"Verb substantive," that which expresses the being or substance which the mind forms to itself, whether it be substantial or not; as, I am, thou art.

"Auxiliary or helping verb," one which serves to help the conjugation of verbs in general; as, to be, to have.

Verditer, a pigment, sometimes used for a blue colour, but more frequently, with a mixture of yellow, for a green. Native verditer is made of the *lapis armenus*, a mineral substance found in Hungary; but the factitious, which is the most common, is said to be usually manufactured in the following manner: the refiners pour their copper-water into a quantity of whiting, which substance imbibes its vitriol and copper, and thus becomes verditer.

VERMES, in natural history, the last and lowest class in the Linnæan system. The animals in this class are not merely those commonly known by the name worms, but likewise those which have the general character of being slow in motion, of a soft substance, extremely tenacious of life, capable of re-producing such parts of their body as may have been destroyed, and inhabiting moist places. There are five orders in this class, viz. Infusoria: Intestina: Mollusca: Testacea: Zoophyta.

VERMILLION, a red pigment, of a hue between the scarlet and the crimson. There are two kinds of vermillion; the one natural or native, and the other artificial or factitious.

Native vermillion is found in several silver-mines, in the form of a ruddy sand, which only requires to be purified.

Factitious or common vermillion is made of the red sulphuret of mercury, or as it was formerly called, factitious cinnabar, reduced to a very fine powder.

VERNIER-*scale*, a scale which is well adapted for the graduation of mathematical instruments, thus called from Peter Vernier the inventor. This method is derived from the following principle: if two equal lines A and B are so divided, that the number of equal divisions in B is one less than the number of equal divisions of A, then will the excess of one division of B above one division of A be compounded of the ratios of one of A to A, and of one of B to B. For if A contain 11 parts, then one of A to A is as 1 to 11, or $\frac{1}{11}$, and if B contain 10 parts then one of B to B will be as 1 to 10 or $\frac{1}{10}$. Now $\frac{1}{10} - \frac{1}{11} = \frac{11-10}{10 \times 11} = \frac{1}{110}$. The vernier-scale, as applied to the barometer, may be thus explained. If each inch of the scale of variation in the barometer be divided into 10 equal parts, marked 1, 2, 3, &c. increasing upwards, and a vernier scale, whose length is $\frac{11}{10}$ths of an inch, be divided into 10 equal parts, marked also 1, 2, 3, 4, &c. increasing downwards, and so placed as to slide along the graduated scale of the barometer, the altitude of the mercury in the tube above the surface of that in the bason may be found in inches and hundredth parts of an inch by these scales. If the surface of the mercury in the tube do not coincide with a division in the scale, place the index of the vernier even with the surface, and observing where a division of the vernier coincides with one in the scale, the figure of the vernier will shew what hundredth parts of an inch are to be added to the tenth immediately below the index; for each of the ten parts on the vernier is equal to the tenth of an inch, and a tenth part of a tenth; but the tenth of a tenth is equal to $\frac{1}{100}$th; thus $\frac{1}{10} \div 10 = \frac{1}{10 \times 10} = \frac{.1}{100}$. Let the surface of the mercury, Plate Miscellanies, fig. 34, be between 6 and 7 tenths above 30 inches, and the index of the vernier being placed even with it, and the figure 2 upon the vernier being observed to coincide with a division on the scale, the altitude of the mercury in the barometer will be 30 inches, 6 tenths and 2 hundredths of an inch, or 30.62.

Verses, in poetry, lines or parts of a composition, the cadences of which are similar in each. The harmony of every verse is complete in itself. Verses are made up of feet, the number and species of which constitute the character of the verse. In the Greek and Roman versification, a foot was determined by its quantity; in the English, quantity is supplied by accent.

There are only three primary kinds of verses in the English language; but these may be varied with all the species of feet.

Vespers, *Sicilian*, in French history, a massacre of all the French in Sicily, in the year 1282. It is so called, because the ring of the bell for vespers was the signal.

Vesuvius, a famous volcano, or burning mountain, situated about six miles east of the city of Naples.

Veterinary *science*, embraces whatever relates to the diseases to which the horse is liable: their symptoms and treatments; the anatomy and physiology of the horse's foot; with an accurate knowledge of the principles and practice of shoeing, of feeding, exercising, &c. of that noble and highly useful animal. To the veterinary practitioner, the study of the principles of his art, the history of the diseases which he is called on to relieve, and the methods of treating them that have been found most successful, are as essential as the study of human economy, and the diseases to which it is exposed, are to the medical practitioner. Hence the necessity of an establishment in which the art should be regularly taught, and which has been founded in this country only about twelve years. This establishment, known by the name of the Veterinary College, is at St. Pancras, about a mile from London, and is under the direction of a most able professor, Mr. Coleman, by whose meritorious exertions, many thousands of horses have been saved to the country, which would otherwise have been lost through the want of proper management. In support of this college a sum is allowed annually by Parliament, in aid of private subscriptions from persons who have the privilege of sending their horses thither for medical advice.

VIBRATION, a regular reciprocal motion of a body, as a pendulum, which being freely suspended, swings or vibrates from side to side. The vibrations of the same pendulum are all in equal times, at least in the same latitude. In our latitude a pendulum 39⅛ inches vibrates seconds: the longer the pendulum, the longer the times of vibration. See PENDULUM.

VICAR, in ecclesiastical polity, a clergyman who does the duty of a church which has no rector; many churches being in the hands of public bodies, or of laymen, who receive the great tythes, and in some instances, the small ones, and who appoint a priest with a convenient salary.

VICE *admiral.* See ADMIRAL.

VICE-*roy*, an officer, who, on the appointment of his sovereign, performs, in some separate territory, all the functions of a king.

Vicount, or viscount, a title of nobility. Literally, the term vicount answers to that of under-sheriff. Those divisions of England which, according to the Saxon language, are called shires, have, according to the French or Norman, the denomination of counties. An earl or count is, properly, the chief officer of a county, and a viscount is his deputy. Henry VI is said to have first introduced the honorary title of vicount.

Victualling office, in British polity, an office to which belongs the concern of victualling, or supplying with provisions, the royal navy. It is kept on Tower-hill, in London, but its agents are dispersed in various parts of the kingdom.

Vinegar, (from the French *vin aigre*, "sour wine)," an acid liquor prepared from wine and various other liquors. The liquors to be made into vinegar, are fermented by being set in the sun, and by the admixture of acid substances, but chiefly by imbibing the oxygen of the air.

Viol, a musical instrument, mounted with strings, and played with a bow. To this general description, belong a considerable number of instruments, differing from each other in size, number of strings, and, consequently, sound.

Violin, a species of viol, with four strings.

Violoncello, with the Italians, the same with the fifth violin; which is a little bass-violin, half the size of the common bass violin, and sounding an octave higher.

Virgo, in astronomy, one of the signs or constellations of the zodiac, and the sixth in order. It is said to contain eighty-nine stars.

Visier, vizir, in oriental governments, a minister of state. The grand, or prime visier of the Ottoman empire commands the whole army, and presides in the divan.

Vision, in physiology, the act of perceiving objects, by means of the organs of sight. Modern philosophers agree in supposing vision to be produced by rays of light, reflected from the several points of objects, received in at the pupil, refracted and collected in their passage through the coats and humours to the retina, or the choroides, and thus striking, or making, an impression on so many points of one of those membranes; which impression is conveyed to the optic nerve, and thence to the brain.

Vitellus, the yolk of an egg, which, by chemical analysis, is found to consist of the following constituents, viz. water, oil, albumen, gelatine. The principal use of the yolk is to furnish food for the young chicken before it bursts the shell.

Vitrification, the conversion of a body into glass. See Glass.

Vitriol, a combination of sulphuric acid with a metallic oxyde. An oxyde is what is commonly called rust. It has received the name of oxyde because it is a combination of oxygen with the substance of the metal. This combination is called oxydation. Vitriols, so called from their resemblance to glass, are now denominated sulphats. See Sulphate.

Vitriol, *green*, is the modern green sulphat of iron.

Vitriol, *white*, sulphate of zinc.

Vitriol, *blue*, sulphate of copper.

Volcanoes, mountains which emit ignited matter and smoke through cavities in the earth, where fires are continually burning with more or less force, according as they are influenced by causes which are hidden from human investigation.

Voltaism, or **Galvanism**, this branch of science obtained the latter name, in honour of Galvani of Bologna, who was the first that led to the discoveries which have since been carried so much farther by Signior Volta, another Italian, and of late by our countryman Dr. Davy, secretary of the Royal Society, and professor of chemistry at the Royal Institution.

In 1791, Galvani of Bologna discovered that a dead frog may have its muscles brought into action by very small quantities of electricity. fig. 1, Plate Voltaism. He also discovered that the same motions may be produced in the dead animal merely by making a communication between the nerves and muscles by means of conducting substances.

Ex. 1. If a living frog, or a live fish, as a flounder, having a slip of tinfoil pasted upon its back, be placed upon a piece of zinc, whenever a communication is formed between the zinc and tinfoil the spasms of the muscles are excited.

2. If a person place a piece of one metal as a half-crown above, and a piece of some other metal as zinc below his tongue, by bringing the outer edges of these pieces in contact, he will perceive a peculiar taste.

The conductors of the Galvanic fluid are divided into the *perfect* and *imperfect*. The perfect conductors consist of metallic substances and charcoal. The imperfect conductors are water and oxydating fluids, as the acids, and all the substances that contain these fluids. The simplest galvanic combinations must consist of three different conductors, not wholly of one class." When two of the three bodies are of the first class, the combination is said to be of the first order; otherwise, it is said to be of the second.

It seems to be indispensibly requisite that in simple galvanic circles, the conductors of one class should have some chemical action upon those of the other. *Ex.* If a piece of zinc be laid on a piece of copper, and a piece of card or flannel moistened with a solution of salt in water, and then three other layers in the same order, and so repeated several times, the whole will form a pile or battery of the *first* order.

When the three bodies which form a galvanic circle of the first order are laid upon one another, the upper and under one not touching, then these two extremes are in opposite electric states. The galvanic effects may be increased to any degree by a repetition of the same simple galvanic combination. These repeated combinations are called galvanic piles or batteries, which may be constructed of various forms.

Ex. 1. Take a number, say 10, of plates of silver, and the same number of pieces of zinc, and also of woollen cloth, the last are to be soaked in a solution of sal-ammoniac in water: with these a pile is to be formed, as in fig. 2. Plate Voltaism, a piece of silver, a piece of zinc, a piece of cloth, and thus repeated. These are to be supported with three rods of glass *a*, *b*, *c*, and pieces of wood *x* and *y*, and the pile is complete, and will afford a constant current of electric fluid, through any conducting substance: thus if one hand be applied to the lower plate and the other to the upper one, a shock will be felt, which is repeated as often as the contact is renewed. The plates will soon become *oxydated*, and require cleaning in order to make them act.

2. Another battery consists of a row of glasses of any shape, as *a a*, fig. 2, containing a solution of salt and water, into each of these except the two on the outside is put a plate of zinc *z*, and another silver *x*; these plates communicate by means of the wires *w w*, and so fastened that the silver *x* in one glass is connected with the zinc *z* in the other; when one hand is dipped into the first glass, and another in the last, a shock is felt. The glasses may be of any number.

It was soon ascertained that if a single combination of three conducting substances produced a certain effect, a second, and a third would produce a double and treble effect. If, for instance instead of six glasses in the above experiment there had been 12 or 20, arranged in the same manner, and a person were to put one hand into the first, and the other into the last, he would feel a considerable shock.

3. The most convenient kind of battery consists of a trough A B fig. 4. made of baked wood, three inches broad and about as deep; in the sides of the trough are grooves opposite to each other: into each pair of grooves is fixed by cement a plate of zinc and silver soldered together, and in the order of silver and zinc, silver and zinc, the cement must be filled in so as to prevent any communication between the different cells. The cells are to be filled

with a solution of water and nitrous acid; when a communication is made between the first and last cell, by the means of the hands, a strong shock is felt, the shock is felt as often as the contact is renewed. This battery was invented by Volta, who seizing the first ideas of Galvani, improved upon them so much as to render it a new science; hence it is generally, and will, probably, be universally, denominated Voltaism. The spark taken upon the plate V G, from the battery by means of the wires *x x*, will inflame gunpowder, charcoal, gold or silver-leaf and other inflammable substances.

This kind of battery may be enlarged to almost any extent: fig. 5. represents one, four times as large as that shewn by fig. 4. the several parts are united by metallic cramps. Batteries of this kind have been constructed so large, that the plates used contained a surface of many thousand square feet. By means of these the most brilliant discoveries have been made. Many substances that were thought to be simple have been analysed, and decompounded; thus if potash placed on the glass *V G*, and the two ends of the wire Z, C be brought together, the salt which was esteemed a simple substance will be found to consist of a metallic substance and oxygen. The new metal thus obtained is called potassium, and has many curious properties. Its specific gravity is less than that of water, being but only about half as heavy as that fluid. A similar result occurs with regard to soda, and the metallic base is called sodium. Potash contains 15 parts of oxygen, and 85 of the base, but the proportions of soda are 20 of oxygen and 80 of metallic base. The base of soda, or sodium is of somewhat greater specific gravity than that of potash. By the same means ammonia, or volatile alkali, has been decomposed, which is found to have a metallic base possessing the most curious properties. Among others it combines with mercury and renders that fluid metal solid, though only the twelve thousandth part of ammonium be used with the mercury; it not only renders the compound solid, but has the effect of reducing the specific gravity from 13 (that of mercury) to 3. By the help of this battery Dr. Davy has decomposed sulphur, charcoal and phosphorus, and they are all found to be combinations of oxygen and metallic bases. The same result have been obtained in experiments on many of the earths; and they will probably all be found to be compounds possessing constituents of a similar nature. Hence it has been inferred that there are two grand principles ever operating in nature, viz. the oxygenous and inflammable, for it is found that these new metallic bases are, in the highest degree, inflammable: they take fire by the contact of the least moisture. Dr. Davy, in the course of his researches, has been led to conclude that the principles of voltaism are to be referred the negative and positive principles of electricity. He found the natural state of a variety of bodies such as to justify this conclusion. Zinc for instance, he ascertained to be in a positive state, and copper is naturally negative; these brought together exhibit signs of attraction. All acids, he says, are naturally negative; and alkalies, earths, &c. positive, and from a combination of these result neutral salts.

Ex. If sulphate of soda, which is a neutral salt,

Fig.1.

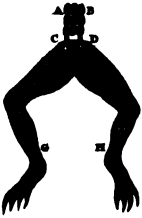


Fig. 2.

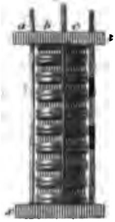


Fig.6.

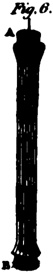


Fig. 3.

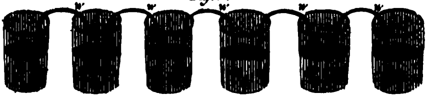


Fig. 4.

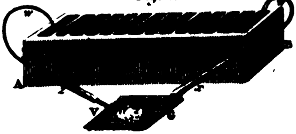
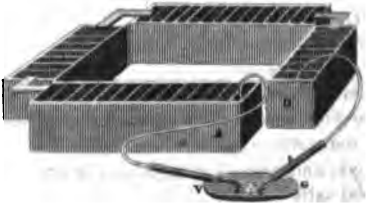


Fig. 5.



Cooper sc

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be brought within the circuit of a voltaic battery, it will be decomposed: the acid will be found attracted to the positive wire z, and the alkali to the negative c. On the same principle the decomposition of water is explained: the oxygen of the water, being negative, is attracted to the positive side, and the hydrogen is attracted to the negative. The general law seems to be that different chemical agents have such a relation to voltaism that some are attracted forcibly to the positive, others to the negative side of the galvanic arrangement.

To shew the decomposition of water by the voltaic battery, the following experiment is given: fill a small glass tube A B fig. 6. with pure distilled water, and connect the wires *x x*, which pass through the corks with the zinc and copper wires z c fig. 5. and if the battery be in full action, there will almost immediately proceed a stream of gas from that wire which is connected with the negative end of the battery, which is hydrogen gas: from the other wire oxygen gas is evolved. The hydrogen may be collected, but the oxygen unites with the wire. Hence voltaism appears to be a peculiar mode of exciting electricity, by the chemical action of certain bodies upon one another. The oxydation of metals produces it in great quantities. It is by the oxydation of the metallic plates that the voltaic effects are produced, of course the action is greatest when the troughs are first filled, and it becomes less and less till the plates are completely oxydated; when it ceases, the plates must be then removed and the oxyde cleaned off before they are fit for farther experiments.

VULGATE, in divinity, the name by which an ancient translation of the Bible is distinguished. It is in the Latin tongue, and is said to have been translated from the Greek of the septuagint. It was formerly known by the name of the italic, or the old. It was the common or vulgar version; before St. Jerome made a new one. The vulgate at present used by the church of Rome, is the version of saint Jerome.

Vultur, the *vulture*, in natural history, a genus of birds of the order Accipitres. The birds of this genus are rapacious to an extreme degree, and sometimes feed in the midst of cities unterrified. They prefer food that is tainted to that which is fresh: they are found most numerous in warm climates, and must be regarded as a race of creatures eminently useful in clearing the surface of the globe from putrid remains, which would otherwise infect the air, and produce all the ravages and mortality of pestilence. There are seventeen species, of which we shall notice only the Vultur Sagittarius, or the secretary vulture, which is distinguished for its size, when standing upright it is full a yard high. It is found in Africa, and in the Phillippine islands; it lives on vermin. It takes up tortoises in its claws, and dashes them to the ground with the greatest violence, and will repeat the process till these animals are completely killed. Plate Nat. Hist. fig. 48.

U.

U, the fifth vowel of our alphabet, is short in many words, as *tub*, *tun*, &c. it is lengthened by a final *e* as *tune*, *tube*. It is mostly long in polysyllables; as in *union*, *curious*; in some words it is obscure, as in *nature*, *venture*. See V.

ULTRAMARINE, in painting, a pigment affording a blue colour. Ultramarine, so called because brought from beyond sea, that is to say, from Hindûstan and Persia, is a triturization of lapis lazuli. If this pigment be now used at all, it is only in miniature painting. It is very expensive, and rarely otherwise than gritty.

UMBER, in painting, a pigment, affording a fine dark-brown colour. It is an earth, and was formerly brought from *Umbria*, in Italy. It is used in two states; the first, its natural one, with the simple precaution of levigation, or washing; the second, that in which it is found after being burnt. The hues of burnt and unburnt umber greatly differ from each other.

UNITARIANS, in church history, a sect of christians, who hold the unity of God in the strictest sense, to the exclusion of Jesus Christ, and of every other person whatever, from being named or compared with the Father, as equal to him, or any thing but wholly dependent on him, who is "the blessed and only potentate, the king of kings, and lord of lords." This account will evidently include the Arians, as well as those who consider Christ as a mere human being, born as other human beings. See ARIAN, in which article for 'externally' read 'eternally.' While it is admitted that those Arians, who do not allow Christ to be the object of divine worship have a title to the claim of Unitarians, it cannot be denied that Arianism is a doctrine that is much on the decline. The great point of discussion is now between Trinitarians, those who admit of three Gods, or three persons in the Godhead, and the Humanitarians, or Unitarians in the strictest sense of the word, who acknowledge one God only; who consider Jesus Christ as the son of Joseph and Mary, and who deny the personality of the Holy Spirit. Unitarians of this class consider Jesus Christ as the great instrument in the hands of God, of reversing all the effects of the fall: as the object of all the prophecies from Moses to his own time: as the great bond of union to virtuous and good men, as having had special communication with God, and speaking and acting from God in such a manner as no other man ever did, and therefore having a peculiar claim to the title of the son of God. They regard him as the means of spreading divine knowledge to all mankind; as under God, the head of all things to his church; as the Lord of life, having power and authority from God, to raise the dead and judge the world at the last day. The unity of God perfect in every attribute: his placability to repenting sinners, without any atonement, and the certainty of a life of retribution after death, are the leading doctrines of Unitarianism.

UNITAS FRATRUM, or, **UNITED BRETHREN**, a sect of Christians, among whom, social polity makes a figure as conspicuous, at least, as religious doctrine. The society of the United Brethren sprung up in Moravia and Bohemia, on the first opening of that reformation which stripped the chair of St. Peter of so many votaries, and gave birth to so many denominations of Christians! Generally speaking, these sectaries adhere to the *Augsburgh Confession*.

From the original seat of their doctrine, they are sometimes called *Moravians;* and from a settlement made in Upper Lusatia, about fifty miles eastward of Dresden, they are generally known, on the continent, by the name of *Hernhuters*. Some persecuted brethren, having emigrated from Moravia, were received by Nicholas-Lewis, count of Zinzendorf, on whose estate they built a town. The ground allotted to them for this purpose, was on the side of a hill, called *Hutburg* or *Watch-hill;* whence they took occasion to call their new settlement, *Hernhut*, "The watch of the Lord." The united brethren are much attached to instrumental as well as vocal music; celebrate agapæ or love feasts, and cast lots, to discover the will of the Lord. Besides the original *Hernhut*, there are two settlements in America, each called *New-Hernhut;* the one in the island of St. Thomas, the other in Greenland: both of these were established under the protection of the crown of Denmark. There are also settlements at Fulnec, near Leeds, and Fairfield, near Manchester, in England. These people live in communities; and provide for their poor; but do not make a common stock of their property. They wear a plain, uniform dress, and are extremely methodical in all their concerns.

UNITED kingdom of Great Britain and Ireland. This title was given to the country in which our readers are particularly interested, in the year 1800, when the union between Great Britain and Ireland was effected. Great Britain includes England, Scotland, and Wales, and was so denominated at the union in the reign of queen Anne. See ENGLAND. The British empire as a whole includes, besides the United Kingdom, very extensive possessions in the northern parts of America; in the West-Indies; in Asia and Africa.

In Europe besides England, Scotland, Ireland and Wales, it includes the Isles of Wight, Anglesea, Man, Orkneys, and the Hebrides. The isles of Guernsey, Jersey, Alderney, Sark, and Malta, and the rock of Gibraltar.

In Africa, Cape-Coast Castle and some inferior dependencies on the coast of Guinea: Sierra Leone and the isles of Goree; St. Helena and the Cape of Good Hope.

In Asia, Bombay; the chief part of the peninsula of India, Bengal, and some subordinate dependencies in Hindostan: Trincomale and Columbo in the island of Ceylon; Botany Bay and other parts of New-Holland: also lately have been added, by the valour of our countrymen, the isles of Bourbon and St. Mauritius.

In America, Nova Scotia, Canada, the Labrador coast, and part of Yutacan; also Demerara, Surinam, Newfoundland, St. John, Cape Breton; the Bermudas, Bahamas, Jamaica, and excepting St. Domingo and Cuba, almost all the other islands in the West-Indies.

UNITED *Provinces*, so called on account of the noble resistance which the inhabitants formerly made to the tyranny of Spain, from which, they, by the aid of the English, separated themselves, and established an independent government, at the head of which was the STADTHOLDER, which see. In the course of the French Revolution these provinces were over-run by the French armies; the stadtholderate abolished, and the provinces were erected into a republic, called the republic of Holland. From this state it was raised to that of a kingdom, and one of the brothers of Buonaparte appointed king. This prince, preferring a private station to that of a king dependent on the tyrannical will of Napoleon, resigned his crown, gave a public declaration of his sentiments, and retired out of the reach of the disappointed Emperor, who seized upon that as a fit opportunity for putting the finishing stroke to his ambitious projects with respect to Holland, and united it to the French empire.

UNITED *States*, see AMERICA.

UNIVERSALISTS, a sect of Christians who principally contend for this one tenet, that all men shall, finally, be received into the happiness of the life to come.

The following reasoning on the question, and on that side of it which a large number of Christians have in all ages embraced, is undeniably deserving of consideration. It aims to erect its hypothesis, the one foot on the doctrine of Arminius, and the other on that of Calvin.

'The Arminian proves, from scripture, that God is love; that he is good to all; that his tender mercy is over all his works; that he gave his son for the world; that Christ died for the world, even for the whole world; and that God will have all men to be saved.

'The Calvinist proves, also from scripture, that God is without variableness or shadow of turning; that his love like himself, alters not; that the death of Christ will be efficacious towards all for whom it was intended: that God will perform all his pleasure; and that his council will stand. The union of these scriptural principles is the final restoration of all men.

'Taking the principles of the Calvinists and of the Arminians separately, we find the former teaching, or at least inferring, that God doth *not* love all, but that he made the greater part of men to be endless monuments of his wrath; the latter, declaring the love of God to all, but admitting his *final failure* of restoring the greater part. The God of the former is great in power and wisdom, but deficient in goodness, and capricious in his conduct. Who that views this character can sincerely love it? The God of the latter is exceedingly good, but deficient in power and wisdom. Who can trust such a being? The Arminians, themselves, were formerly called *universalists.*'

Universe, a collective term, including all worlds, and all created things.

University, a name applied to a national establishment for the benefit of learning, wherein professors in the several branches of science and polite literature are maintained, and where degrees, or honours attached to the attainments of scholars, are conferred. Such an establishment is called a *university* or *universal school*, as intended to embrace the *whole* compass of study. The universities of Great Britain are seated at Oxford, Cambridge, St. Andrew's, Glasgow, Aberdeen, and Edinburgh.

Ursus, the *bear*, in Natural History, a genus of the class mammalia, and order feræ, of which there are ten species. The Ursus Arctos, or brown bear, is met with in almost all the northern countries of Europe and Asia, and lives solitary in remote forests, subsisting principally on fruits and other vegetable substances, and occasionally devouring animals. It is particularly fond of honey, and is said to possess great sagacity in discovering it. These animals are often taken young, and subdued to a great degree of tameness and docility, and taught a variety of tricks and dances. Ursus Maritimus, or Polar bear, is nearly double the size of the common bear. It is completely white. See Plate Nat. Hist. fig. 47. It it chiefly found on the shores of Greenland and Hudson's bay, and it inhabits only the coldest regions in the world. In winter the Polar bears ingulph themselves in the snow, or immure themselves in some cavern where they pass the long Polar night, making their egress with the re-appearance of the sun. In summer they are frequently found on large masses of ice at sea, and swimming with great excellence they pass from one of these to another with much facility. They are sometimes however carried to vast distances from land, and perish for want of the means of subsistence. They generally produce two young ones at a birth, and the attachment between these and the dam is one of the strongest exhibited in the whole animal creation. The natives of Kamtschatka always avoid firing at a young bear if the dam be present, as the rage of the latter to revenge the injury is active and unbounded: she moreover deplores the destruction of her cubs by sounds and gesticulation indicating the most violent and heart-rending sorrow, folding them, though lifeless, to her bosom, attempting to recover them back to animation, and continuing by them long after the last spark of life has been extinguished in them.

Usance, in commerce, the time fixed for the payment of bills of exchange, reckoned either from the day on which the bill is accepted, or from that of its date, varying in different countries, and thus called, because, wholly dependent on *use or custom*.

Usher, literally, a 'door-keeper.' It is a false pronunciation of the French 'huissier,' formed from 'huis' 'a door.' In Britain, usher is the name given to several public officers, in which sense, it seems to be synonymous with sergeant. These ushers are in waiting, introduce strangers, and execute orders, as those of taking offenders into custody. Usher is also used as the denomination of an assistant to a school-master; where it seems to refer to his office of introducing the scholars to learning.

Usher *of the black rod*; one of the gentlemen-ushers of the court. He carries the rod at the feast of St. George, and is employed to correct, by its touch, any knight who may have offended against the statutes of the order. He also arrests state delinquents of quality.

W.

W, the twenty-first letter of our alphabet, is composed, as its name implies, of two *v*'s, or *u*'s, both the *v* and *u* being formerly written as the *u*. It was chiefly in use among the northern nations, the Teutones, Saxons, Britons, &c. and not known in the Hebrew, Greek or Latin languages. Even

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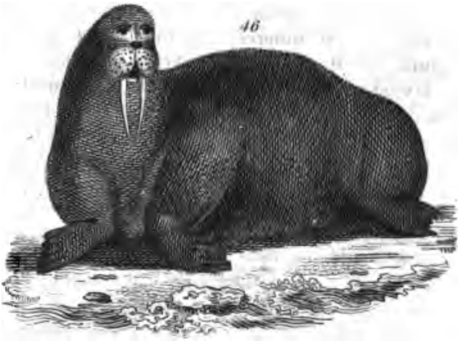

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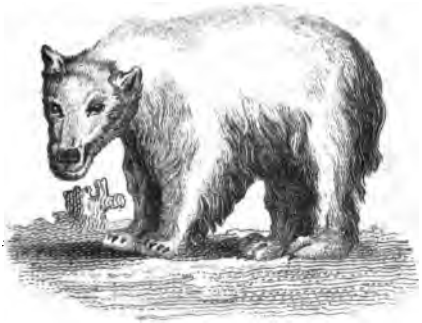

Cooper sculp

Fig. 46. **Trichecus** *dugong: Indian Walrus.*
Fig. 47. **Ursus** *arctos: White Bear.*

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now it is not to be found among the French, Italians, Spaniards, and Portuguese, except in proper names and in terms borrowed from languages in which it is originally used, and then it is sounded like the single *v*. With us the *w* is a consonant at the beginning of words, and a vowel at the end. It may stand before all the vowels excepting *u*, as in *water*, *wedge*, *winter*, *wonder*: it may follow the vowels *a e o*, as in *law*, *dew*, *vow*. See V, U.

Wafers, are made with a mixture of fine flour, isinglass, and a small portion of yeast. These being beat together into the form of fine batter, it is spread on even tin plates, and dried in a stove, and cut out for use.

Wapentake, a Saxon word, synonymous with hundred, and is used chiefly in the northern counties beyond the Trent.

Wardmote, a court kept in every ward in London, usually called the wardmote court; of this court the inquest has power every year to enquire into all deficiencies with regard to the officers of the ward.

Warp, in weaving, the threads that extend lengthwise on the loom, and across which the workman, by means of his shuttle, passes the threads of the woof.

Wassal-bowl, a large drinking vessel, in which the Saxons, at their public entertainments, drank health to each other, saying ‘ Wæs hæl!’—‘ Health be to you?’ or ‘ Your health!’ The *Wassal-bowl* is therefore the wæshæl-*bowl*. It was also a Saxon custom, to go about with such a bowl, at the time of the epiphany, singing a festival song, drinking the health of the inhabitants, and, of course, collecting money to replenish the cheer. This custom, from which christmas-boxes, christmas-ale, bell-men's verses, and carols, are all, probably, more or less derived, was called *wassaling*, and those who practised it, *wassalers*. In Sussex, and some other parts of the kingdom, the primitive custom, and its name, are still retained.

WATCH, in mechanics, a machine which shows the parts of time, and may be carried in the pocket. The invention of the *spring*, which answers to the *pendulum* of a clock, and without which a time-keeper for the pocket cannot be made, is attributed both to Hooke and to Huygens.

Among the first watches, according to the modern acceptation of the name, that were made in England, was that presented to Charles II. This was inscribed, *Robert Hooke inven.* 1658. *T. Tompion fecit*, 1675.

WATCH, *Death*. See DEATH.

WATER, in physics, an incompressible fluid, composed of oxygen and hydrogen.

WATER-*spout*, in natural history, a phenomenon which is conceived to be occasioned by the congress of opposite winds in one point or center. A water-spout is commenced by the formation of a dense cloud, the upper part of which is white, and the lower, black. From the inferior limb, depends, or rather falls down, a conical tube, the smaller end approaching the surface of the water, or earth, over which it happens to be raised. On the 15th of August, 1687, M. de la Pryme observed a spout in Yorkshire. The wind blowing at the same time out of several quarters, a great vortex or whirlwind was created among the clouds, from which there every now and then dropt down a long, thin, black pipe, in which he distinctly beheld a motion like that of a screw, continually drawing, and screwing up, as it were, whatever it touched. In its progress it moved slowly over a grove of trees, which bent under it like wands, with a circular motion; tore off the thatch of a barn; bent a large oak-tree, and broke off one of its main branches, which it threw to a considerable distance. These *spouts* are also called *typhons* and *siphons*. When they occur over a river, or the ocean, the water rises to meet it, some yards above its level; and it is often scarcely to be distinguished, whether this column of water, or the cone, is the first formed.

WAX, in natural history, an unctuous substance, with which bees build their cells, and which they collect from the apices of flowers. The bees carry the *farina* or *pollen*, on their hinder legs; but, according to Reaumur, this dust does not contain any real wax, nor is this latter substance produced by the mixture of the farina with a glutinous liquor, by trituration, or by any other mechanical process. After long and attentive observation, this naturalist found, that bees actually eat the pollen they collect, and that this pollen is converted, by an animal process, into wax.

The pollen gathered by the bees is of various colours; but the combs they construct are always of the same. Every comb, especially when it is newly made, is of a pure white colour. This is liable to be injured by age, the operation of the air, and by other accidents. To bleach wax, therefore, it is only necessary to extract the foreign bodies that have insinuated themselves into its substance, and observed its original colour: hence the distinction, in commerce, between white and yellow wax; the first being bleached, and the second only melted.

Weather, rules for judging of: 1st. the rising of the mercury in the barometer, in general, presages fair weather, and its falling foul weather: when the mercury is convex it is in a rising state, but if the surface be concave it is falling. 2. In very hot weather, the falling of the mercury indicates thunder. 3. In winter the rising of the mercury indicates frost. In frosty weather if the mercury falls much there will be a thaw. In a continued frost if the mercury rises, it will snow in a short time. 4. When bad weather happens soon after the depression of the mercury, it will soon clear up: on the contrary there will be but little fair weather, when it proves fair shortly after the mercury has risen. 5. In bad weather when the mercury rises much and high, and continues so two or three days before the rain is over, then a continuance of fair weather may be expected. 6. In fair weather when the mercury falls much and low, and so continues for two or three days before the rain comes, then much wet may be expected, and probably high winds.

Weather-*glasses*. See Barometer, and Thermometer.

Weaving, the art of making a web or weft of cloth, which is done by uniting threads alternately crossing each other; the warp extending in length, and the woof in breadth. If the origin of weaving be inquired for, it ought surely to be derived from the art of matting grass, reeds, and the divided filaments of canes.

WEDGE. See MECHANICS.

WEDNESDAY, the fourth day of the week, so named from Wodan, Woden, or Odin. Ash-Wednesday, the first day of Lent, so called from the ancient custom in the Roman church, of sprinkling *ashes* upon the heads of penitents.

WEEK, in chronology, a period of seven days, or one hundred and sixty-eight hours, containing one complete planetary cycle, according to the ancient astrological system.

WEIGHT, in physics, the same with gravity. See GRAVITY.

WHEEL, and AXIS. See MECHANICS.

WHEEL *Barometer*, this instrument is shewn in fig. 16, Plate Miscellanies, vol. 1. A, represents the quicksilver in a glass tube, having a large round head or ball, and turned up at the bottom: upon the surface of the mercury in the recurved leg there is placed a short glass tube loaded with mercury with a string going over a pulley, and balanced by another weight hanging freely in the air. As the surface at A is large, and that at B is small, the motion of the quicksilver, and consequently of the ball A will be considerable, but as the weight moves up and down, it turns the pulley, and that, a hand or index; and by the divisions of a large graduated circle, the minutest variations of the air are plainly shewn.

WHIGS, in British history, a denomination given to those who in politics are more or less hostile to the prerogatives of the crown, and in religion to the episcopal establishment; as that of *tories* is to those who are more or less attached to absolute government in their politics, and to the power of the clergy in their religion. See Tory.

White, in chromatics, a colour which, according to Newton, is composed of all colours; those natural bodies only appearing white which reflect all the kinds of coloured rays alike.

Whitsuntide, the fiftieth day after Easter, and which is properly called *Pentecost*. It is said to have received its popular name from the circumstance, that, formerly, people, newly baptized, came to church, between Easter and Pentecost, in *white* garments.

Wic, a Saxon word, which terminates the names of many places in England, and always signifies a place of dwelling. It would be strange if, as etymologists have repeated from one another, it denoted, indifferently, a place on the sea shore, or on the bank of a river, a street, a village, a town, a castle, a port, or harbour; were it not the true state of the case, that it imports a place of dwelling, or abiding, whether that place be on the sea shore, or on the bank of a river; a street, a village, a town, a castle, or a port or harbour. It is under this general sense that, in Essex, wic still signifies a farm.

Wickliffites, or Lollards, in church history, the followers of John Wickliffe, one of the first reformers, and who lived in the reign of Edward the Third.

Will, *freedom of*. The point in discussion between the advocates of philosophical free-will, and necessarians, is, whether a man be invariably and necessarily influenced; or whether he possess a self-governing, self-determining power, which he may exert by acting either according to motives, in opposition to motives, or without motives at all. See NECESSITY.

In support of philosophical liberty, its advocates make their chief appeal to consciousness: they maintain that we are not only insensible to an overpowering and resistless influence of motives, but are positively conscious of choosing without any motive, and often, even in opposition to the strongest. They also maintain that the moral and religious consequences, considered as arising from the system of necessity, are regarded by the advocates for free-will as of a nature so repulsive to the interests of virtue, so incompatible with moral discipline, so full of palpable absurdity and extreme impiety, that these alone are deemed sufficient to justify the rejection of a doctrine from which they appear essentially and decidedly to flow.

WILLOW, see SALIX.

WIND, is the motion of the air, or of the whole body of the atmosphere or any part thereof from one place to another. This motion, called wind, is occasioned by the rarefaction and condensation of the air. As it is a fluid, the natural state of air is rest, which it always endeavours to preserve, and, if disturbed, to recover. When, therefore, this equilibrium is destroyed by rarefaction in particular places, the weightier air will rush in to restore it. This, in general, accounts for the various currents of air, called sea and land breezes, monsoons, hurricanes, &c.

In the temperate zones, the wind being variable, blows from all quarters at different times. But in some countries this irregularity is not so great; and in others it blows from a particular quarter, and with nearly the same degree of force, at certain seasons of the year.

In those parts of the Atlantic and Pacific Oceans nearest the equator, where the sun's influence in rarefying the atmosphere is most powerful, there is a regular wind throughout the whole year, called the trade wind. On the north side of the equator, it blows with a little variation from the north east, and on the south side of it from the south-east. The space included between the 2° and 5° north latitude, is the interval limit of these two winds; and there calms and storms are frequent. In the Atlantic Ocean, the trade-winds extend farther north on the American than on the African coast. In the Indian Ocean they blow constantly from 10° south to 30° south latitude; but northward of this they change every six months, and blow directly opposite to their former course. These regular winds are called monsoons. When they shift their direction variable winds and storms succeed for a month, or longer. The monsoons in that ocean may be reduced to two, viz. one on the north and another on the south side of the equator, and they extend from Africa to the longitude of New-Holland and the east coast of China.

In the Mediterranean the north wind blows nearly three-fourths of the year. An easterly breeze arises from the land in the evening, and a sea breeze from the west in the morning. In the Strait of Gibraltar there are seldom any winds except the east and west. On the north east coast of Asia, the prevailing winds blow from the west.

In different countries the direction of the winds differs considerably according to the situation of the places where the observations have been made. In Great Britain the south-west is by far the most frequent wind. In April, May, and part of June, the east wind is common, especially on the east coast of the island. In Ireland the south-west and west are the trade winds. On the south coast of Europe the most frequent winds are the north, the north-east, and the north-west; and on the western coast the north-west prevails.

Wind-*gage* is an instrument for measuring the force, or velocity of the wind. An ingenious portable anemometer was constructed by Dr. Lind of Windsor, and is described in the Phil. Trans. for the year 1775. It consists of a glass tube $\frac{4}{10}$ inch diameter, bended so as to form two legs parallel to each other, and 8 or 9 inches in length. On the upper end of one of the tubes, is fitted a thin metal tube turned outwards, with its mouth open to receive the wind blowing horizontally into it. A steel spindle, about which the instrument easily moves, passes through two slips of brass near the top and bottom of the tubes, and may be screwed into a block at the time of observation. When the instrument is used, the tubes are to be filled with water half full. The wind blowing in at the mouth of the metal tube, forces the water down in the one tube and raises it so much higher in the other. But, as the wind does not blow with uniform velocity, the water is apt to fluctuate in the tubes; to remedy this the incurvated part of the tubes should be contracted to $\frac{1}{10}$ inch diameter. The distance between the two surfaces of the water estimated by a scale of inches and parts of an inch, placed by the sides of the tubes; will be the height of a column of water whose weight is equal to the force of the wind blowing against an equal base. For every inch the surface of the water is raised, the force of the wind will be equal to as many times 5⅕ pounds on a square foot. From the force of the wind so obtained its velocity may be deduced.

WIND-*gun*. See PNEUMATICS.

WINDLASS, in a ship, is an instrument in small ships, placed upon the deck, just abaft the foremast: it serves to weigh, that is to raise anchors, or to hoist any heavy weight, in or out of the ship.

WINE, a liquor drawn from vegetable bodies, and fermented. *Wine* differs essentially from *spirit*, in this particular, that the former is *fermented*, and the latter *distilled*. From the definition here given, it will be evident, that ale, cider, and other vegetable fermented liquors, are properly wines; though the term is, by custom, confined to liquors drawn from the grape. Wines are divided into two principal classes; *red* and *white*. *White wines* are of an amber colour, more or less deep; but so called, to distinguish them from the *red* wines, or *clarets*. The generality of white wines are made from white grapes; but some are from black ones, the skins of which are carefully kept from imparting their colour.

WINTER, in cosmography, one of the four seasons of the year, commencing on the day when the sun's distance from the zenith of the place is the greatest, and ending on that when it is at a mean between the greatest and the least.

Wire-drawing, the art of drawing metals into thin threads or wires. It consists in drawing them, successively, through holes in iron bodies, each hole being smaller than that used before. That property of metals by which they submit to this operation without breaking, is called their *ductility;* the reverse, their *friability*.

Woad, in dyeing, a drug used to give a blue colour. It springs from seeds annually sown in the spring. The ancient Britons are said to have tinctured their bodies with the dye procured from this plant; and, according to some, *glass* is derived from one of its names.

Wold or weld, a plant used in dyeing, to give a yellow colour, which, however, is of a very fading quality. Weld is much cultivated in Kent. It requires dry soil.

Wood, *cutting in*, much used by booksellers &c. to save the higher expence of engraving in copper: also in calico printing. We have many specimens of exquisite beauty in the art of wood-engraving. The cutters in wood begin with preparing a block of wood, usually of box or pear-tree: on this, when made very smooth, they draw their design with a pen or pencil, exactly as they would have it printed; or they fasten the design drawn on paper upon the block with paste, and a little vinegar, the drawing being turned towards the wood. When the paper is dry they wash it gently off with a sponge dipped in water, till nothing is left on the block but the strokes of ink that form the design, which mark out what part of the block is to be cut off very carefully with the points of sharp knives, chissels, or gravers according to the delicacy of the work.

Woof, in weaving, the threads thrown with the shuttle.

Wonder, the seven wonders of the world, as they are popularly called, were the Egyptian pyramids; the Mausoleum erected by Artemisia, the Temple of Diana at Ephesus, the walls and hanging gardens of the city of Babylon, the Colossus or brazen image of the sun at Rhodes, the statue of Jupiter Olympius, and the Pharos or water tower of Ptolemy Philadelphus.

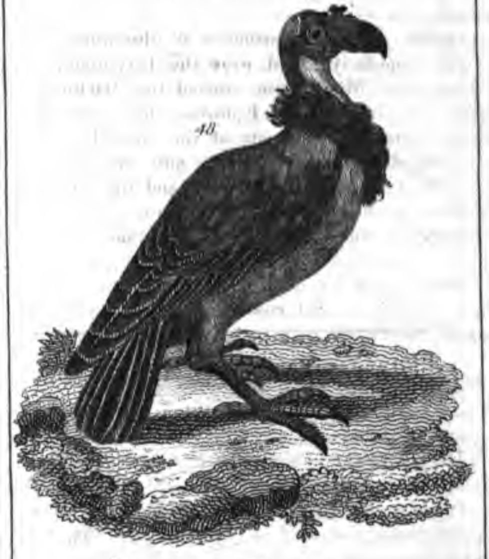
Worms, in natural history, animals that are particularly distinguished by having only one ventricle to the heart, and no auricle; and being furnished with a cold, colourless sanies, instead of blood. See Vermes.

X.

X, is the twenty-second letter of our alphabet, and a double consonant. It was not used by the Hebrews or ancient Greeks. X begins no word in our language, but such as are of Greek original, and is found in few others but what are of Latin derivation, as *perplex*, *reflexion*, &c. The sound of the *x* is often expressed by that of the single letters *c k s*, in *backs*, *necks*, &c. by *c c* as in *access*, and by *c t* as in *action*. In numerals X expresses 10, and when a dash is placed over it, it stands for 10,000.

Xiphias, the *sword-fish*, in natural history, a genus of fishes of the order Apodes. There are

48



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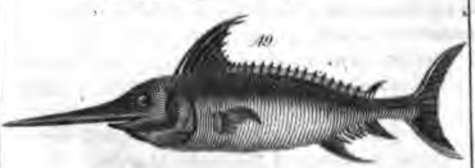

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Fig. 48. **Vultur** *papa: king vulture*.
Fig. 49. **Xiphias** *gladius: sword fish*.

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three species, of which the Xiphias Gladius, or common sword-fish, is of the length of twenty feet, and is particularly distinguished by its upper jaw being stretched to a considerable distance beyond the lower, flat above and beneath. It is an extremely rapacious fish, and finds in the above instrument a weapon of attack and destruction able to procure it the most ample supplies. It is found in the Mediterranean, chiefly about Sicily, and is used by the inhabitants of that island, for food. See Plate Nat. Hist. fig. 49.

Y.

Y, the twenty-third letter of the alphabet, is a consonant at the beginning of words, and placed before all vowels, as in *yard*, *yield*, *young*, &c.: at the end of words it is a vowel, and is substituted for the sound of the *i*, as *cry*, *descry*, &c. It is seldom used in the middle of words except in those derived from the Greek, as in *chyle*, *chyme*, &c. though in *dying*, *flying*, &c. it is admitted into the middle of pure English words.

Yacht, in naval architecture, a vessel of from thirty to one hundred and sixty tons burden, and furnished with mast and sails. A yacht is intended for carrying passengers, and is usually decorated. An English yacht is intended to go to sea, but the Dutch ones are principally used on rivers and canals.

Year, in chronology, a given period or cycle. Many ancient nations called a revolution of the moon, or what we denominate a *month*, a *year*, and accordingly, 1000 of their years amounted to something more than eighty-three solar years. With others, the year consisted of two, three, or four months.

"*Solar year*," the space of time in which the earth completes its revolution round the sun; this, with the possible error of a few seconds, is 365 days, 5 hours, and 49 minutes.

The solar year is either *astronomical* or *civil*; the *astronomical solar year* is the portion of time here specified; the *civil*, is that form which a nation chuses to adopt: thus the *civil solar year* may begin on any given day, and be divided into any given parts.

The several civil years used by different nations in Europe, are five, the Julian, the Gregorian, the French, and the two modes of reckoning used at Rome; the one commencing from the anniversary of the nativity, and the other from that of the incarnation.

Yeast, a scum rising upon beer or ale during fermentation: it is used for a leaven or ferment in the making of bread, as serving to render it lighter, softer, and more delicate.

Yellow, in chromatics, a bright colour, as its name imports. It reflects light more than any other colour, except white.

Yeoman, in English polity, a *commoner*. In ancient times, it denoted one of those who held *folk-land*; that is, had no *fief*, or book-land, and therefore did not rank among the *gentry*. What he possessed, however, he possessed independently; he was, therefore, no man's vassal. To understand the true condition of the ancient yeomen, it must be observed that there were some lands which never became subject to the feodal system. These were called folk-lands or the lands of the people. When, therefore, it is said that the king is the lord of the soil of all England, the assertion is not true. He is certainly the lord paramount of all fiefs; but he has no such reversionary interest in lands that were never held in fee. This is the foundation of *gavel-kind.* See Gavel-*kind.*

Yew, in botany, a tree remarkable for its duration. There were a short time since, near Rippon in Yorkshire, seven very large yew trees called the seven sisters, which according to tradition were standing in the year 1088. It is said when Fountain's abbey was building, and which was finished in 1283, the masons used to work under the shade of these trees: one of them, when measured, was found to be nearly 12 yards in circumference.

Yunx, the wry-neck, in natural history, a genus of birds of the order Picæ, of which there is only a single species: it is allied to the woodpecker in some respects, and in others to the cuckow. It makes no nest, but lays eight or ten eggs on the bare wood in hollow trees. In England it is a bird of passage, generally appearing a few days before the cuckow. Its food consists of ants: it is never seen in flocks, and in pairs only during the spring and summer.

Z.

Z, the last letter of the alphabet, has been sometimes thought a double consonant having the sound of *d s*. Among the ancients Z stood for 2,000, and $\bar{z}$ for the square of 2,000 or 4,000,000. Z Z among the ancient physicians used to express myrrh, and at present they are used to signify *Zingiber* or ginger.

Zenith, in astronomy, the vertical point, or that which is immediately over head. The zenith is also called the pole of the horizon, because it is 90°. distant from all its points. The point diametrically opposite to the zenith is the *nadir*. This is immediately under foot.

Zeus, the dory, in natural history, a genus of fishes of the order Thoracici: the zeus faber or common dory is found in the Northern, Mediterranean, and Atlantic seas. It is sometimes seen in the London market, and is in considerable estimation as an article of food.

Zinc, a metal which is found in Europe, but never in a pure state. It is of a bluish-white colour, somewhat lighter than lead. It has some degree of malleability and ductility, since, by compression, it may be reduced into thin plates and drawn into wire. Zinc combines with almost all the metals; and, in metallurgy, is ordinarily made to do so with copper. When the proportions are three parts copper and one of zinc, the compound is called *brass*; when three parts zinc, and one of copper, *pinchbec*.

Pinchbec, or *princes metal*, which last denomination is derived from its having been invented by prince Rupert, is of a colour nearly resembling that of gold.

The ores of zinc are calamine and blende. Calamine is an oxyde: blende is a sulphuret. These ores are found in many countries, and in a number of mines in this country. The metal is obtained from the ore by distillation.

Zodiac, in astronomy, an imaginary circle encompassing the heavens, the two outlines of which comprehend the excursions of the sun and planets, while the line that divides its whole circumference into two parts, is the ecliptic.

The zodiac is divided into twelve portions, each of which is distinguished by the name of an animal or other figure.

Zone, in geography and astronomy, 'a girdle,' or circular division of the earth, by which is described the degrees of heat peculiar to different regions.

"Frigid zones," two divisions of the earth, including the polar latitudes, and terminated, the one by the arctic, and the other by the antarctic circle.

"Temperate zones," two divisions, the one north and the other south of the equator, bounded by the tropics and the polar circles.

"Torrid zone," a division of the earth comprehended between the two tropics.

The zones are distinguished from one another by various phenomena. To the inhabitants of the torrid zone the sun is vertical twice a year. In the middle of that zone the days and nights are always equal, viz. 12 hours, and the twilight is short because the sun descends perpendicularly below the horizon. Its circuit under the equator is about 9,000 leagues, and under the tropics 8253. Within its limits there are only two seasons in the year, viz. winter and summer: but these are diversified by various causes.

Zoölogy, a discourse on animals or living creatures, comprehending whatever relates to their natural history.

Linnæus divides the objects of zoölogy into six classes. See Natural History.

Zoöphyta, in zoölogy, a word signifying "animal plants," and the name of the fifth order of Linnæus's sixth class. See Animal *Flower*, Plant, and Polype.

Zoöphyta are composite animals holding a medium place between animals and vegetables. Most of them take root and grow up into stems, multiplying life in their branches and deciduous buds, and in the transformation of their animated blossoms or polypes, which are endowed with spontaneous motion. Plants, therefore, resemble zoöphyta, but are destitute of animation and the power of loco-motion; and zoôphyta are, as it were, plants, but furnished with sensation and the organs of spontaneous motion. Of these some are naked and soft, and others are covered with a hard shell: the former are denominated by naturalists zoöphytes, and the latter are called lithophytes. There are fifteen genera. The coral reefs that surround many islands, particularly those in the Indian Archipelago, and round New Holland, are formed by various tribes of animals which generate these corals with such rapidity that enormous masses of them very speedily appear where there were scarcely any marks of such reefs before.

ADDITIONS AND CORRECTIONS.

VOL. I.

Alumine, in chemistry, one of the five earths, which, till lately, were esteemed simple bodies. Alumine is the earth of alum, which is an essential ingredient of the clays, hence it was formerly denominated argil. Alumine has scarcely any taste, and when quite pure very little smell, but if it contain any portion of iron it emits a peculiar smell when it is breathed on, known by the name of the earthy smell. None of the earths is of more importance to mankind than alumine; it forms the basis of China and stone-ware of all kinds, and of the crucibles and pots employed in all those manufactures which require a strong heat. It is necessary to the operations of the dyer and calico-printer, and is employed with great advantage by the fuller, and the scowerer of cloths.

Page 134, *line* 13, *for* externally *read* eternally.

—— 196, *line* 4, *for* sock *read* socket.

Ballusters, in architecture, small pillars used for ballustrades.

Page 366, *line* 1, *for* surface *read* furnace.

Denmark and **Norway**, in geography, the former is a small kingdom containing the peninsula of Jutland, and the islands of Zealand, Funen, &c.

at the entrance of the Baltic. Its chief town is Copenhagen, in the island of Zealand. That part of the sea situated between Zealand and Funen, is called the Great Belt, and that which divides Funen from the continent of Denmark is called the Little Belt. Iceland is subject to Denmark, as is Norway, being united to it under one sovereign in 1387. The chief towns of Norway are Christiana, and Bergen. Norway is the most mountainous country in the world; its chief wealth is in its timber.

VOL. II.

Diving-*bell*, fig. 18, is explained in the article itself; in fig. 19 we have the representation of one invented by Mr. Adam Walker. To this machine are attached balls of lead which are sufficiently heavy to make it sink of itself; on the outside there is a bended metal tube *a b c*, with a stop cock *a*, and a flexible leathern tube *d c*, joins on at *c*, this is connected with a forcing air pump *d*, which supplies the diver abundantly with fresh air. By means of a machine of this construction the greatest part of the rich ship Belgioso which had been wrecked, was saved.

Page 282, line 5 from the bottom, for δω *read* δις.

VOL. III.

Page 77, line 7 from bottom, } *dele references*
Page 78, line 9 } *to* Plate II.

History: it has been suggested that the plate entitled, "*History of England,*" may require some explanation. It commences with the government under British chiefs, of whom Caractacus, Boadicea and Vortigerne are mentioned. To these succeeded the Romans under Cæsar, Claudius, &c. The next great change was the division of the country into seven kingdoms, called the HEPTARCHY, which see. These were reduced and consolidated into one kingdom under the Saxon Egbert, who was succeeded by several other princes of the same line, of whom Alfred is noted on account of his great talents and patriotic virtues. The Danish sovereigns who succeeded the Saxons are then recognized in Canute, Edward the Confessor, and Harold, of whom the last yielded to William the Norman usually styled the *conqueror*, and from him have descended all succeeding monarchs in the order in which they are placed. See, in connection with this, the article MEMORY ARTIFICIAL, p. 280.

HYÆNA, in natural history, a figure having been given of this animal, and no notice taken of it under the word CANIS, to which genus it belongs, we shall observe, that hyenas are generally found in Asia and Africa. Their manners are untractable and ferocious, and truly indicated by the gloom and malice expressed in their countenance. They inhabit rocks and caves, and shun the light of day, avail themselves of darkness to commit their depredations. They feed not only on the prey which they have killed, but upon any putrid carcases, and the bodies of the dead are often torn up from their graves in the church yards where they have been deposited, and devoured with the keenest relish. They follow the motion of contending armies, anticipating by the associations furnished by experience, the feast to be supplied from human conflict and human carnage.

VOL. IV.

Page 126, *line* 7, *for* E *read* C.

—— 133, *line* 11, *for* L *read* V.

—— 141, *line* 11, *from the bottom*, *for* Quarty *read* Quartz.

SCRIPTURES, of the *Old* and *New* Testament. Under the word Bible we have given a brief account of the books of the Old Testament; we shall in this place give a summary of the contents of the New Testament. The collection of writings composed after the ascension of Christ, and acknowledged by his followers to be authentic, is known in general by the name of *καινη διαθηκη*. This title was not applied to these writings by the Apostles themselves, but adopted in a very early age. The Greek word *διαθηκη* may be translated either *covenant* or *testament*, we usually apply the latter term, with regard to the Christian scriptures, as St. Paul made use of the words *παλαια διαθηκη* when speaking of the Jewish scriptures.

The New Testament consists of four historical books, known as the gospels of Matthew, Mark Luke and John; the ACTS of the Apostles (which see), the epistles, and the book of Apocalypse or Revelation.

The gospel of Matthew was written by the person whose name it bears, who was a Jew and familiarly acquainted with the opinions, ceremonies, and customs of his countrymen, and it was written in their own language at the time while Peter and Paul were preaching the gospel at Rome, and founding the church there. See MARK and LUKE.

The gospel by St. John was evidently intended to supply the deficiencies of the other gospels. It was written towards the close of the 1st century, and is remarkable for simplicity of style; it abounds with Hebraisms, and contains many strong oriental figures which are not readily understood by common readers.

Of the epistles fourteen were written by St. Paul. The epistles may, generally, be considered as commentaries on the doctrines of the gospel, addressed to particular societies, accommodated to their respective situations, intended to refute the errors and false notions which prevailed among them, and to inculcate those virtues in which they were most deficient.

The epistles of James, Peter, John and Jude, are usually called the seven Catholic or general epistles, because most of them are inscribed not to particular churches, but to the body of Christian converts over the world.

The book of Revelation contains a variety of prophecies relating to the future state of the church and world.

Page 234, *line* 15, *for* fig. 1. Pl. Steam Engine, fig. 34. Pl. Miscellanies, *p.* 358.

SPAIN and PORTUGAL, now usually spoken of as "The Peninsula," is the chief seat of war between Buonaparté and the United Kingdoms of Great Britain and Ireland. Both countries are divided into provinces, and the chief towns of

Spain are Madrid, Seville, Corunna, and Cadiz; of Portugal, Lisbon, and Oporto. The government of Portugal has found an asylum from the tyranny of the Corsican emperor, in South America; the king of Spain is under the dominion of Buonaparté, who has substituted his brother Joseph in his stead. The treasure and some of the best blood of our own country have been expended, and are expending in the cause of these kingdoms to rescue them if possible from the grasp of him whose ambition knows no bounds, and who is attempting to make himself lord of the world.

Page 260, *line* 14, *for* Steam Engine fig. 2, *read* Miscel. fig. 28.

Suspended Animation, *means of restoring*. The suspension of life consists of infinite modification, from the transcient fainting-fit, to the death-like torpor of a day's duration. We have under the article Drowning given an account of the methods to be used on persons apparently dead by immersion in the water. In the case of a person apparently dead by hanging, similar methods are to be adopted, with this addition, that opening the jugular vein, or applying cupping-glasses to the neck, will tend considerably to facilitate the restoration of life, by lessening the quantity of blood contained in the vessels of the head, and thereby taking off the pressure of the brain.

When a person is struck by lightning, strip the body and throw buckets full of cold water over it, for ten or fifteen minutes; let continued frictions and inflations of the lungs be also practised, and gentle shocks of electricity be passed through the chest. A similar mode should be adopted when a person is apparently dead by noxious vapours, as sitting in a room with burning charcoal, or by being exposed to the vapours of wells, cellars, &c. or by intoxication with fermented liquors.

SYPHON, in hydraulics, a bended pipe, one end of which being put into a vessel of liquor, while the other hangs over into another vessel. The external side must be longer than that which is immersed in the liquor, and the air being sucked out of the long end, the liquor in the vessel will follow the air, flow over, and continue to run till it is empty.

FINIS.

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